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Creating a VAPEPS Database – A VAPEPS Tutorial

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ABSTRACT

This report outlines a procedural method for creating a VAPEPS Database. The method of presentation employs flowcharts of sequential VAPEPS Commands used to create a VAPEPS Database. The commands are accompanied by explanatory text to the right of the command in order to minimize the need for repetitive reference to the VAPEPS user's manual. The method is demonstrated by examples of varying complexity. It is assumed that the reader has acquired a basic knowledge of the VAPEPS software program.

CONTENTS

1. INTRODUCTION

This report is intended to be a reference for users with some basic knowledge of the VAPEPS software.

The VAPEPS (VibroAcoustic Payload Environment Prediction System) is a computer program that is used to analyze, predict, and manage vibration and acoustic data obtained from Space Shuttle and Expendable Launch Vehicle payload components. Additionally, VAPEPS provides a full range of software routines that can be used to manipulate and perform computational operations on the data.

VAPEPS software commands can be grouped into three functional categories: Computational operations, Database operations, and Prediction operations. This report is devoted exclusively to a discussion of the commands and routines associated with VAPEPS Database operations; specifically, the process of creating a local database. A local database is created by, and serves the needs of, individual organizations. It may contain vibroacoustic data, structural data, Statistical Energy Analysis (SEA) model data, and related information for specific payload components. A general overview of database management, excerpted from Ref. 1, is provided in Appendix B.

The local database vibroacoustic and SEA model data for specific payload components may, with the approval of the JPL VAPEPS Management Center, be deposited in the JPL VAPEPS Global Database. The requirements are specified in Appendix E. The VAPEPS Global Database provides a data reference source that may be accessed by the Aerospace community to obtain data for predicting environments for new or similar payload components. A data module naming convention to promote such accessibility, excerpted from Ref. 1, is provided in Appendix C.

2. THE DATABASE PROCESSORS

Four VAPEPS processors are utilized to create a Database. Each processor consists of a series of commands with options specified by parameters. In sequence of application, they are: the ENTER processor, the PREP processor, the DICTIONARY processor, and the ADMINISTRATION processor.

2.1 THE ENTER PROCESSOR

The ENTER processor is used to read vibroacoustic test event information into a database. The following Event information can be entered into the database: Event Description, Channel Description, Frequency Analysis Information, and Acoustic and/or Vibration Spectral Data. The ENTER processor features include: a channel name change capability, acceptance of data processed in non-standard frequency bands, and data input by sections. This latter feature allows one to supplement incomplete data at a later stage in the process. It also permits the categorization of data to sensor; that is accelerometer data, microphone data, etc. However, the ENTER processor can only read spectral data in a fixed-field FORTRAN format and each line of input must contain a channel identification, a sequence number, and data. The Event information, input thru the ENTER processor, is stored on a DAL file designated by the user. Once stored, the data may be operated on by various VAPEPS commands. The Event data must be processed by the ENTER processor prior to using the PREP processor.

2.2 THE PREP PROCESSOR

The PREP processor is used to define a database Event and standardize the raw data input from the ENTER processor. PREP is divided into sections which are accessed by issuing subcommands within PREP. The following subcommands allow the user to input or modify existing input of the following sections: BOOK - book-keeping section, CHANnel - channel description section, CONFiguration - configuration tree section, MODUles - data modules section. The CHECK subcommand is used to standardize the raw data input. PREP is that phase of the database entry process where key words and physical parameters associated with the Event are entered into the database. Later, users may interrogate the database, using the SEARCH processor, for those key words and parameters that satisfy certain criteria for Events and/or data modules.

2.3 THE DICTIONARY AND ADMINISTRATION PROCESSORS

The DICTIONARY and ADMINISTRATION processors are used to transmit ENTERed and PREPed data to the local Database Master File. These two processors utilize "write protected" files; consequently, the DICTIONARY and ADMINISTRATION processors can only be accessed by the designated local VAPEPS Database Administrator. The DICTIONARY processor is used to establish and maintain a Data Dictionary of Events on the Database Master File. New entries to the Data Dictionary are preceded by the RUN=PADMIN process of VAPEPS. This process extracts all words to be defined from the specified Event and creates a list for input to the DICTIONARY/PREADMIN command. The DICTIONARY/PREADMIN process authorizes the input list for the Data Dictionary and this process must be invoked if the Event is to be saved on the Database Master File.

3. PROCESSOR COMMAND SEQUENCES

The command sequences for the individual processors are presented in the following sections. A pseudo flowchart format is used wherein the VAPEPS commands and prompts are presented on the left with explanatory remarks on the right. This format should eliminate the need to reference the manual except for those instances when a more detailed explanation of the command and/or prompt is required.

3.1 THE ENTER PROCESSOR

The following pages describe the command sequence and define the commands for the ENTER Processor.

The ENTER Processor

The ENTER Processor is used to store information for an event in a DAL file. Once stored in a DAL file, the data may be operated on by other VAPEPS commands. The event's data must be processed by ENTER before it can be stored in the standardized Vapeps Database with the PREP Processor. The ENTER Processor processes the following vibroacoustic test event information: Event Description, Frequency Analysis Information, Channel Descriptions, and, Acoustic and/or Vibration Spectral Data.

Required command parameters shown as CAPS; options lower case.

```
ENTER NU,VENT,isec,nin,ipnt,ifat
```

ENTER - command call.
NU - dal unit designated for output.
VENT - 4 character name to identify this database. All dal elements created by ENTER will bear this name.
isec - # of data input sections.
If isec = 0 (default) all data must be entered at this time.
If isec > 0 multiple data sections are to be entered. The data sections must be identified by sequential values of isec (isec = 1 , isec = 2, etc)
nin - fortran unit # containing Channel Description and/or Spectral input data.
If nin = 5 (default) input will be read from primary input unit (terminal,etc)
If nin > 0 All input data is read from fortran unit nin.
If nin < 0 All input is read from fortran unit 5 except spectral data; spectral data will be read from fortran unit -nin.
ipnt - Output print option.
If ipnt = 0, all specifications and general event description are printed.
If ipnt = 1 (default), prints as per ipnt = 0 plus channel and frequency summary.
If ipnt = 2, prints as per ipnt = 1 plus tabular listing of spectral data.
ifat - Fatal error option flag.
If ifat = 0, data channels without error will be saved. Data channels with error will have to be corrected and processed as another section.
If ifat = 1 (default) data with errors will not be saved.

prompt

```
DESC:
DESC:
DESC:
DESC:
```

DESC: - Prompt for event description. Up to four lines of descriptive text may be entered to describe event. Each line may be up to 72 characters in length.

prompt

```
NCHAN, NFRQ, ITYP, ITCH >
NDVPC, IFORM, IFREQ, ISEQ, IOVER >
```

NCHAN - # of channels of Spectral data (accelerometers and /or microphones).
NFRQ - # of frequency bands required to analyze data.
ITYP - Type of frequency band required to analyze data.
If ITYPE = 3, 1/3 octave band
If ITYPE = 1, whole octave
If ITYPE = 0, constant bandwidth
If ITYPE < 0, user specified bands
ITCH - # description lines/channel in Channel Description Section.
If ITCH = 0, one line for measurement type and units - applies to all sections
If ITCH = 1, one line/channel for measurement type and units and rename channel.
If ITCH = -1, same as ITCH = 1 but no rename channel
If ITCH = 2, two lines/channel; 1st line as per ITCH = 1; 2nd line is comment
If ITCH = -2, same as ITCH = 2 but no rename of channel

NDVPC - # of data values/line in Spectral Data Section. Data values may include the Spectral data, overall level, and frequencies. Channel ID and sequence #'s are not considered as data values.

IFORM - Order of information on each line in Spectral Data Section.
If IFORM = 1: DATA, ID, SEQUENCE
If IFORM = 2: DATA, SEQUENCE, ID
If IFORM = 3: ID, DATA, SEQUENCE
If IFORM = 4: ID, SEQUENCE, DATA
If IFORM = 5: SEQUENCE, DATA, ID
If IFORM = 6: SEQUENCE, ID, DATA

IFREQ - The pattern of Frequency Vs Spectral Data as it appears in Spectral Data Section
If IFREQ = 0, No Frequencies embedded in data
If IFREQ = 1, Freq and Data alternate (Freq,Data,Freq,Data,....)
If IFREQ = -1, Data and Freq alternate (Data,Freq,Data,Freq,...)

ISEQ - Starting value of sequence # for each Channel in Spectral Data
If ISEQ = 0, sequence # begins at 1 and continues sequentially
If ISEQ > 0, sequence # begins at ISEQ and continues sequentially

IOVER - Indicates where overall level for each channel appears in Spectral Data
If IOVER < 0, No overall level in data. Level input in Channel Description
If IOVER = 0, No overall level in data
If IOVER = 1, Overall level is the first data value in channel data
If IOVER = 2, Overall level is the last data value in channel data

prompt

FORMAT:

FORMAT: Prompt for fortran format for input. Enclose format in parenthesis.
Allowable format types are:
For data values: E (floating point), F (fixed point)
For Channel ID: A (alphanumeric), I (integer)
For Sequence #: I (integer)

prompt

START >

START: Prompt for input. Enter center frequency value.
If ITYPE = 1 or 3, Enter center Frequency value.
If ITYPE = 0, Enter center freq. value, bandwidth.
If ITYPE < 0, Enter CF(1),...CF(NFRQ). (CF - Center Freqs.)
Enter BE(1),...BE(NFRQ). (BE - Lower Band Edges.)
Enter TL(1),...TL(NFRQ). (TL - Upper Band Edges)

prompt

ID, NAME, TYPE, UNITS, RMS:
DESC:

ID: Chnl ID used in spectral data. This ID will be used for post-Enter ref to chnl if not renamed. If Chnl ID was integer, it must be renamed to a hollerith name.

NAME: New Chnl ID. Max length 4 character hollerith for post Enter ID.

TYPE: Measurement Type: MIC - Microphone; SMIC - Surface microphone; NSMC - Non surface microphone; ACC - Accelerometer; VIB - accelerometer; NACC - Normal accelerometer
NNAC - non normal accelerometer

UNITS: Measurement Units: P2PH - psi**2/Hz; PA2H - Pa**2/Hz; G2PH - g**2/Hz;
IA2H - (in/(sec**2))**2/Hz; FA2H - (ft/(sec**2))**2/Hz;
MA2H - (m/(sec**2/))**2/Hz; DBSP - 10*log(psi**2/8.4144E-18)
VLSP - 10*log(g**2/8.4144E-18), DBVL - 10*log(m/(sec**2))**2/1.0E-10)

RMS: Optional Root Mean Square or overall level. Specified only if IOVER < 0

DESC: Channel Description. Max 72 characters allowed.

Data Entry

The spectral data is entered at this point. Each line in this section must contain (1) an integer sequence #, (2) Channel ID, (3) Numeric Data. The order of entry is specified by IFORM. Numeric data can include Spectral, Freq, and overall values. The last line of this section must be a blank line.

3.2 THE PREP PROCESSOR

The following pages describe the command sequence and define the commands for the PREP Processor.

```
 -----------------------------------------------
 : The PREP Processor                          :
 -----------------------------------------------

The PREP Processor is used to define a DataBase event and standardize raw data input(from ENTER) associated with an event.
PREP is divided into sections which are accessed by issuing subcommands within PREP. The sections of PREP allow for input or
modification of: BOOK- keeping information, CHANnel description, CONFiguration trees, and data MODUles. PREP is that phase of
the DataBase Entry Process where key words and physical parameters are input that will later be searched using a Query Mode.

                                                   Required command parameters shown as CAPS; options lower case.

 ------------------------
 PREP NU,VENT,nsec               PREP - Command Call
 ------------------------        NU   - Dal unit used for ENTER data or previously PREPed event
          :                      VENT - Event name defined in ENTER Command
          :                      nsec - Status of data read in with ENTER Command
          :                             If nsec < 0 (default), event has been previously processed by PREP
          :                             If nsec = 0, only 1 data section was input in ENTER
          :                             If nsec > 0, 1 thru nsec data sections were input in ENTER
          :
       prompt
          :
 ------------------------
 PREP>                           PREP - Prompt for any PREP subcommand. Subcommands are:
 ------------------------               BOOK -  for input of bookkeeping keywords of the data processing agency
          :                             CHAN -  for modification of ENTER Channel information
          :                             CHECK - for conversion of original data input of ENTER to standard format
          :                             CONF  - to describe vehicle configuration
          :                             MODU  - to define subsystems of the vehicle configuration
  selected Subcommand                   DONE - Exits PREP
          :
 ------------------------
 PREP>CHECK nsec                 CHECK - collects and converts data and descriptor Dal elements created in ENTER.
 ------------------------                creates a set of DAL elements containing data of a standard format with
          :                              consistent pressure and acceleration units over fixed frequency bands.
          :                              CHECK is performed automatically the first time an event is PREPed and is
          :                              normally executed as a subcommand only if a modification or an additional
          :                              section has been added to the ENTER information for an event that has been
          :                              PREPed. nsec (option) is the # of ENTER sections for the event.
          :                              If nsec = 0, 1 data section; If nsec > 0, data sections 1 thru nsec
          :                              ENTER data is converted to the following standard units by CHECK:
          :                              ACOUSTICS: DBSP (10log(psi**2/PREF))  PREF = 8.4144E-18 psi**2
          :                              VIBRATION: VLSP (10log(g**2/GREF))    GREF = 8.4144E-18 g**2
          :
   selected subcommand
          :
 ------------------------
 PREP>CHAN                       CHAN -  to permit additions and modifications to the event's channel table. This table
 ------------------------                is created by PREP for each new event and is updated by using the CHECK
          :                              subcommand of PREP. Descriptive information, in addition to that input during
          :                              ENTER, may be added in the channel section. Subcommands within CHAN, entered at
          :                              the CHAN Prompt are:
```

```
     :
   prompt
---------------
CHAN>
---------------
```

LIST ALL desc - lists the channel table. If option desc is selected, general channel description is included.
LIST DESC - lists the channel descriptions
LIST RANGE I1, I2 desc - lists items I1 thru I2 of channel table. desc optional
LIST TYPE ITEM desc - lists the channel table for all channels of type ITEM desc optional.
CHANGE ALL - change all values in channel table by accepting input following the command. Input lines must have the form:
CHAN ITYPE, FLOW, FHIGH, X, Y, Z, SYSTEM
CHANGE TYPE - change the ITYPE field in the channel table. Input form is:
CHAN ITYPE
CHANGE FREQ - change the FLOW, FHIGH fields in the channel table. Input form is:
CHAN FLOW, FHIGH
CHANGE COORD - Change the X, Y, Z System fields in the channel table. Input form is:
CHAN X, Y, Z, SYSTEM
Note: The channel name CHAN must match a name already in the table. Input is accepted until a blank line is encountered.
OMIT - exits CHANNEL without saving changes
DONE - exits CHANNEL (blank line also exits)

```
   selected subcommand
         :
------------------------
PREP>BOOK
------------------------
         :
      prompt
         :
---------------
BOOK>
---------------
```

BOOK - to enter basic book-keeping information into the database of the event being PREPed. This info is limited to fields describing key aspects of the event. Subcommands within BOOK, entered at the BOOK prompt, are:

APROPOS - displays words that have been used in BOOK in previous events.
WORDS - displays the list of words
DEFINITION WORD - yields a definition for WORD (use not recommended - slow)
INIT - clears all sections of BOOK
LIST - lists out all sections of BOOK that have been defined
DONE - saves any changes to BOOK and exits BOOK (also by RETURN key)
OMIT - exits BOOK without saving changes
PROC - defines the event as seen by the agency processing the data. Saved in database master file processed by ADMIN. Not subject to change. Input is: (use * for placeholder of arguments not used. 12 chrtrs/argument).
PROC AGENCY, PROGRAM, PROJECT, ID (agency = agency name, program = program name, project = project name, id = identifier, first 4 letters of id must match event name created during ENTER process.
CONT - defines the event as seen by the contracting agency. Input form is:
CONT AGENCY, PROGRAM, PROJECT, ID (similar to agency, id = identifier)
COGN - defines the event as seen by the cognizant agency. Input form is
COGN AGENCY, PROGRAM, PROJECT, ID (similar to contracting agency)
DATE - defines the date the event took place. Input form is
DATE MM/DD/YY (mm = month, dd = day, yy = year. 2 character limit each)
TIME - defines the time the event took place. Input form is:
TIME HH:MM:SS.FRAC (hh = hour (24 hour clock), mm = minute, ss = second, frac = second fraction)
EVENT - defines the type of event. Uses up to 12 characters/arg. Input form
EVENT CLASS, TYPE, ID1, ID2 (class = word to describe class of test, type = type of test, id1 = 1st identifier, id2 = 2nd identifier (user choice)

Recommended For CLASS, TYPE:
Ground, Reverberant; Ground, Direct; Ground, Progressive, Ground, Captive; Ground, Dir-Rev; Flight, Liftoff; Flight, Landing; Flight, Ascent; Flight, Reentry

Recommended For ID1:
Development; Qual; Acceptance; Protoflight; Prototype

LOCA - defines the location of event. Uses up to 12 characters/arg. Input form LOCA GLOBAL,LOCAL,ID1,ID2 (global = global location, local = local location, id1 = 1st identifier, id2 = 2nd identifier)

VEHICLE - defines the vehicle that will fly the test item. 12 VEHICLE CLASS,TYPE,CONF,ID (class = vehicle classification, type = vehicle type, conf = vehicle configuration, id = other identifier)
Recommended For CLASS,TYPE:
Shuttle, Enterprise; Shuttle, Columbia; Booster, Titan; Booster,Atlas; Booster, Thor; Booster, Tat

DESC - Optional subcommand to allow for general information input. 4 lines of up to 72 characters/line allowed. If DESC is not specified in PREP, these 4 lines are a duplicate of those specified in event description of ENTER.

selected subcommand

```
----------------------
PREP>CONF nu,name
----------------------
```

CONF - To enter vehicle configuration tree which defines hierarchy of subsystems that make up the vehicle as it was tested or flown. The configuration tree is composed of branches. The branches are related to one another by showing which branch is the parent branch to the current branch. Branches are described by global names and local names. Global names are used to describe the branch and local names are used to describe the hierarchy of the branches. Global names are key words that may be searched by users operating in the database query mode. nu,name (options), if used, are the DAL unit and event name of an existing database event which are read in as the configuration tree for this event.

Subcommands within CONF are entered at the CONF prompt. These subcommands, used to create,delete and list configuration tree branches, are:

```
--------------
CONF>
--------------
```

APROPOS - displays the words used in CONF of previous events
WORDS - redisplays the list of words
DEFINITIONS - displays definitions of words listed by WORDS
DEFINITION WORD - displays definition for specified WORD in WORDS list
LIST - lists the entire configuration tree
LIST I1 - lists line I1 of the configuration tree
LIST I1,I2 - lists lines I1 thru I2 of the configuration tree
DISA I1 - disable command. Marks for deletion branch I1 of the configuration tree
DISA I1,I2 - Marks for deletion branches I1 thru I2 of configuration tree. Disabled branches are deleted upon exit from CONF.
ENAB I1 - Enable command. Enables branch I1 of configuration tree that have been marked for deletion.
ENAB I1,I2 - Enables branches I1 thru I2 that have been marked for deletion.
PACK - removes all disabled configuration tree branches.
CHECK - checks configuration tree for errors. Checks database master file for global names GENERIC and SPECIFIC and advises user.
OMIT - exits CONF without saving changes
DONE - executes CHECK, PACK commands saves changes and exits CONF
READ NU,NAME - allows user to add an existing configuration tree from another database event to the tree being built
NU,NAME = DAL unit and event name of existing event.

prompt

CONF>INPUT
ltgsme>

selected subcommand

PREP>MODU mxmod,mxct,mxcps

prompt

MODU>

INPUT - allows user to create or add branches to the event's configuration tree. This subcommand prompts for the inputs:
LAST,THIS,GENERIC,SPECIFIC, mount,enclosure
LAST - local name of parent branch of the current branch (4 chartrs max).
Note: trunk of tree must be designated by $.
THIS - local name of current branch (4 chartrs max).
GENERIC - Global generic name for current branch (12 chartrs max).
SPECIFIC - Global specific name for current branch (12 chartrs max).
mount - local branch connected to current branch (non-tree). (option).
enclosure - local branch which encloses current branch (option).

MODU - The MODUles subcommand of PREP allows the user to further define a branch of an events CONFiguration tree by creating data modules for the branch. These data modules can be assembled to represent one or more subsystems within the general system that was tested. Data module inputs are :transducer names, key descriptions and acoustical/structural parameters. Transducer names in the data module are the specific channels used for the instrumentation of the subsystem (a subset of those in the event's CHANnel table. The physical characteristics of the subsystem are defined by the key descriptions and the acoustical/structural parameters. The acoustical/structural parameters form a SEA model. By including SEA models in the database, predictions can be made on new systems by extrapolation from systems previously saved in the database. This routine uses the SERCH and PRED commands of VAPEPS. The options of the MODU subcommand are:
mxmod - maximum # of modules for this event (default = 20 or 5 plus current #)
mxct - maximum # of channels for all modules (default = 2(cnt #) or cnt # + 20)
mxcps - maximum # of channels /SEA element (default = 15)

Subcommands within MODU are entered at the MODU prompt. These subcommands are used to create, delete and list the data modules for the event. The subcommands are:

APROPOS - displays the words used in MODU of previous events
WORDS - redisplays the list of words
DEFINITIONS - displays definitions of words listed by WORDS
DEFINITION WORD - displays definition for specified WORD in WORDS list
LIST - lists the entire module table.
LIST I1 - lists line I1 of the module table.
LIST I1,I2 - lists lines I1 thru I2 of the module table.
DISA I1 - disable command. Marks for deletion module I1 of the module table.
DISA I1,I2 - Marks for deletion modules I1 thru I2 of module table.
Disabled branches are deleted upon exit from MODU.
ENAB I1 - Enable command. Enables module I1 of module table that has been marked for deletion.
ENAB I1,I2 - Enables modules I1 thru I2 that have been marked for deletion.
PACK - removes all disabled modules in the module table.
CHECK - checks modules in module table for errors. Checks for compatability with configuration and channel sections of event.
OMIT - exits MODU without saving changes
DONE - executes CHECK, PACK, SAVE commands, saves changes and exits MODU.
SAVE - saves the module table on DAL unit using EVENT name.(see DONE)
READ NU,NAME - allows user to add an existing module table from another database event to the module table for this event.
NU,NAME = DAL unit and event name of existing event.
DUMP - produces a long listing of the entire module table.
DUMP I1 - lists line I1 of the module table.
DUMP I1,I2 - lists lines I1 thru I2 of the module table.

selected subcommand

MODU>DAMO nu, name, NEW

prompt

DAMO>

```
REMOVE MODULE,CONF,ZONE - allows user to disable a module in module table
       MODULE,CONF,ZONE = 3 argmt module name in module table listing.
EDIT NUM - allows user to edit existing modules or copy existing modules into
           new modules and then edit. This command puts user at DAMO level.
       NUM = module number as listed in module table. This form of EDIT does not
             change original module name.
EDIT MODULE,CONF,ZONE,new - as per previous command.
       MODULE,CONF,ZONE = 3 argmt module name in module table listing.
       new - (option) specifies a new local module name where the output of the
             edit session will reside. To become part of the module table, the
             module NEW must be associated with a configuration tree branch.
CHANGE MODULE,CONF,ZONE,newmod,newconf,newzone,newsystem,newx,newy,newz - allows
             user to to modify name of a data module as it is listed in module
             table.
       MODULE,CONF,ZONE = 3 argmt module name.
       newmod,newconf,newzone,newsystem,newx,newy,newz - (options). New names and
              values of the module. These options may be truncated at any point,
              leaving the remaining names and values unchanged.
ATTACH MODULE,CONF,ZONE,SYSTEM,X,Y,Z - creates an entry in the module table.
              Modules formed by the DAMO operation must be associated with a
              branch of the event's configuration tree. ATTACH defines this
              relationship thru the option ZONE. It also allows for associating
              a coordinate system and integer coordinates with the module.
       MODULE,CONF,ZONE - 3 argmt module name in module table. The name defined
              by these argmts must be unique. If not other modules with this name
              will be disabled and will be lost upon execution of PACK or DONE.
 DAMO nu,name,NEW - used to create a data module in the event's module table.
      nu,name - (options) DAL unit and name of DAL element containing a module
      previously created by SAVE in DAMO or by DAMO in VAPEPS. If these options
      are specified and NEW is omitted, the local module name will be NAME.
      NEW -   local data module name.
```

Subcommands within DAMO are entered at the DAMO prompt. The subcommands are:

```
  DESC NAME1,NAME2,NAME3 - used to describe the module as a whole. The 3 argmts
         (up to 12 chrtrs each) are saved in the database master file and can be
         searched for by users.
* EXTA name1,name2,name3 - a SEA element acoustic volume that communicates with the
         SEA elements SKIN and INTA. The 3 optional argmnts (up to 12 chrtrs each)
         may be saved in the database master file.
* SKIN name1,name2,name3 - a SEA element structure that communicates with the SEA
         elements EXTA,INTA, and MONT. 3 options as described above.
* INTA name1,name2,name3 - a SEA element acoustic volume that communicates with the
         SEA elements SKIN,EXTA,MONT,and INST. 3 options as described above.
* MONT name1,name2,name3 - a SEA element structure that communicates with the SEA
         elements INTA,SKIN,and INST. 3 options as described above
* INST name1,name2,name3 - a SEA element structure that communicates with the SEA
         elements INTA and MONT. 3 options as described above.
* FRAM name1,name2,name3 - an optional SEA element structure used to define the
         physical connection between SEA elements SKIN and MONT. (only useful
         if MONT is a truss). 3 options as described above.
```

```
NOTE: When the subcommands designated by * are invoked, the following subcommands may
      be issued to input,modify,delete,list, and save the contents of the SEA element
      as well as move to another SEA element or to exit DAMO:

      P* NAME=VALUE,NAME=VALUE - used to set the values of named physical parameters
                which describe the SEA element.(Ref PREDICTION section VAPEPS manual)
                NAME = allowable parameter name VALUE = parameter value expressed as
                a real number.
      C* C1,C2,C3,...Cn - used to define channel names to be associated with the SEA
                element. Channel names must exist in channel table of events.
                C1,C2,C3,...Cn = channel names
      REMOVE C1,C2,C3,...Cn - used to deassociate channnel names, previously entered by
                the C* subcommand, from SEA elements.
      LIST - list contents of the module/SEA element
      LIST para or LIST chan - option form for parameter or channel listing only.
      READ NU,VER(,zone) - allows user to read in a data module previously stored in
                DAL element by subcommand SAVE or by DAMO issued from VAPEPS.
                NU,VER = DAL unit and version containing data module.
                zone = (option) Sea element to read in; otherwise all SEA elements will
                       be read in by READ.
      SAVE NU,NAME - allows user to save data module in DAL elements not associated
                with event.
                NU,NAME = DAL unit and version name where data module will be stored.
                The names of these elements will be:
                NU,PARA,NAME - for physical parameters
                NU,DCHN,NAME - for channels associated with the module
                NU,DMDC,NAME - for module descriptions
     CHECK - checks the data module for errors, calculates non-dimensional parameters,
              and lists a summary of the module.
     DONE -  executes the CHECK subcommand and exits DAMO.
```

3.3 THE DICTIONARY AND ADMINSTRATION PROCESSORS

The following pages describe the command sequence and define the commands for the DICTIONARY and ADMINISTRATION Processors.

The DICTIONARY and ADMINISTRATION Processors

The DICTIONARY and ADMINISTRATION Processors are used to transmit ENTERed and PREPed event data to the DataBase Master File. The Master File and Dictionary File are "write protected files"; consequently, the DICTIONARY - ADMINISTRATION processors can only be accessed by the designated Vapeps DataBase Administrator. The DICTIONARY Processor is used to establish and maintain a Data Dictionary of events on the DataBase Master File. New entries to the Data Dictionary are preceded by using the Vapeps RUN=PADMIN process. This process extracts all words to be defined from the specified event and creates a list for input to the DICTIONARY Processor.

```
RUN=PADMIN NU,VENT          RUN=PADMIN - command call. This command extracts all words to be defined from the
                                         specified event and creates a list for input to the DICTIONARY/PREADMIN
                                         command.
                            NU           - dal unit where event is stored
                            VENT         - event name

DICTIONARY/PREADMIN N1,EVENT  DICTIONARY/PREADMIN - command call. This command enters the Direct Dictionary Interface
                                                    processor which allows for the maintenance of the Data Dictionary.
                            N1                    - dal unit where Data Dictionary resides (unit 15).
                            EVENT                 - name of event whose words are to be added to Data Dictionary.
       prompt

DICTIONARY>                 DICTIONARY - Prompt for any DICTIONARY subcommand. Subcommands are:
                                    DEFINE WORD - WORD is word to be defined.
                                    DELETE WORD - WORD is word to be deleted. Deletes word, word definition
                                                  and synonym.
                                    LIST ? - Lists Data Dictionary in alphabetic order.
                                    LIST WORD - Lists definition and synonym for WORD.
                                    LIST SECTION - Lists words in section.
                                    SPILL ? - Spills Data Dictionary to fortran unit 6.
                                    SPILL WORD - Spills all information for WORD.
                                    SPILL section - Spills all information for section
                                    SYNONYM WORD SYNONYM - this command associates another word in the Data
                                            Dictionary to the word specified. word = word for which SYNONYM is
                                            synonym. SYNONYM = word which is synonym of word.
                                    DONE - Exits Data Dictionary

ADMINISTRATION MU           ADMINISTRATION - Command call.
                            MU             - Unit number of master file. MU defaults to unit 13 if not specified.
                                             MU sets Master File unit number for run duration unless reset by
                                             re-entering the ADMIN processor with a different value. Under normal
                                             operation MU should always equal default value.
       prompt

ADMIN>                      ADMIN - prompt for any ADMIN subcommand. Subcommands are:

                                   SPILL - Used to dump an entire event in symbolic form for transmission to other
                                           sites. Input form is SPILL NU,VENT,NOUT,NELT,NVER. (nu,vent = dal unit
                                           and event name; nout = fortran unit or dal unit to which card images will
                                           be written; if nelt and nver are not specified, will write to fortran unit
```


ORIGINAL PAGE IS
OF POOR QUALITY

nelt, nver = element name and version on dal unit nout to which card images will be written) Alternate commands, available in Vapeps are: RUN=ESAV and RUN=SPIL.

FLIP - Used to transpose files in the Master File. These files may then be interrogated using general Vapeps commands as opposed to the more specific SEARCH command. This command requires experience with Vapeps and is not normally used.

SAVE - Used to write portions of an event file to the Master File. A saved event is available for searching, etc. Input form is SAVE NU, VENT (nu, vent = dal unit and event name). NOTE: The SAVE command writes into the Master File. This requires write access to the Master File which is available only to the Vapeps Administrator. The SAVE command will not execute if an authorization list, prepared by the DICTIONARY/PREADMIN command is not present.

4. APPLICATIONS

Examples of application for the individual processors are shown in the following sections. As previously mentioned in Section 3., a pseudo flowchart format is used, wherein the VAPEPS commands and/or the prompts and responses are presented on the left with explanatory remarks on the right.

In creating a local Database, the required data may be input to the processors by using either the Interactive Mode or the Batch Mode of VAPEPS. The drawback to using the Interactive Mode of VAPEPS is that this mode will dump ALL the input data if an error is detected in ANY of the input data. This mode of operation is recommended only where there is a minimum of inputs.

The Batch Mode is strongly recommended for those operations involving a multiplicity of commands and/or data. In this mode of operation, the command and data inputs to the processors are via structured run streams; consequently, if input errors are present, the data dumped by VAPEPS is still retained in the run stream file. Corrections may then be made to the data in error and the run repeated. A convenient method of operation is to use the Batch Mode with both input and output files; the input file being the run stream and the VAPEPS results being directed to the output file. The output file may then be edited for specific report formats, etc., by using the computer system editor. A typical Batch Mode operation of this type, specifically for the MassComp Computer, uses the command: VAPEPS<ENTERI2 >ENTERO2. A further recommendation is to use CAPS for all commands.

Five examples are shown in the following sections. Examples 1 thru 3 illustrate the use of the ENTER processor only. Examples 4 and 5 progress, in sequence, thru the ENTER, PREP, DICTIONARY, and ADMINSTRATION processors. Example 4 was developed by excerpting information from Ref. 3. This excellent reference, which documents the creation of a local Database for the Tomahawk Missile, was extremely useful in the development of this tutorial. Example 5 is intended to be a somewhat complete example of a typical VAPEPS process which progresses from the modeling stage to the creation of the local Database. The VAPEPS model of the Galileo Spacecraft: Lower sections is excerpted from the VAPEPS Newsletter, Issue 2, Summer 1988. This is presented in Appendix A. The steps required to create a Database for this model are discussed and the response levels measured in the Galileo protoflight acoustic test are used as input to the ENTER processor in Example 5. Additional examples can be found in Volume IV of Ref. 1.

NOTE: Variations in the output format of the processors may be attributed to the currently installed version of VAPEPS.

4.1 THE ENTER PROCESSOR

The following examples demonstrate the various input and output options available within the ENTER processor. Using the ENTER processor command flowchart for reference while reviewing these problems should expedite the learning curve. When the VAPEPS command is issued, the VAPEPS logo appears. The ENTER command and subsequent entries, and the resulting outputs, are shown in the examples. The Interactive Mode was used in Example 1. The run streams used in the other examples precede the VAPEPS output.

```
---------------------------
EXAMPLE - 1
---------------------------
                              VAPEPS
          (VibroAcoustic Payload Environment Prediction System)
                           Version 5.4
                           System UNIX
                       (Released April 1988)
                                                                          Vapeps Logo

                           Developed by
                  LOCKHEED MISSILES & SPACE COMPANY

                           Sponsored by
                   NASA/GODDARD SPACE FLIGHT CENTER
                                &
                     US AIR FORCE/SPACE DIVISION

              User support and database management by
                     JET PROPULSION LABORATORY

                      Current Date:   04/22/88
                      Current Time:   14:54:31
                    Available Core:      20000
                    Execution Mode:   Interactive
 ?enter 1,DEMO                                                           Enter command, Dal unit, Event name
 DESC: In this example, the optional parameters are not specified.
 DESC: Enter implements the default values:isec = 0, nin = 5, ipnt = 1
 DESC: ifat = 1. Thus, data will be entered in 1 section from the terminal   description
 DESC: and output will be event desc. plus channel & freq summary.
 NCHAN,NFRQ,ITYP,ITCH> 3,3,3,2                                           3 data channels,3 freq bands,1/3 octave
                                                                         2 lines/channel description
 NDVPC,IFORM,IFREQ,ISEQ,IOVER> 1,1,0,0,0                                 1 data value/line;Data,ID,Sequence
                                                                         no freq in data;seq starts @ 1;no overall

 FORMAT: (F9.4,I4,I4)                                                     format for Data,ID,Sequence

          EVENT NAME = DEMO,    CLASS =    0

EVENT DESCRIPTION:

IN THIS EXAMPLE, THE OPTIONAL PARAMETERS ARE NOT SPECIFIED.
ENTER IMPLEMENTS THE DEFAULT VALUES:ISEC = 0, NIN = 5, IPNT = 1
IFAT = 1. THUS, DATA WILL BE ENTERED IN 1 SECTION FROM THE TERMINAL      Vapeps output
AND OUTPUT WILL BE EVENT DESC. PLUS CHANNEL & FREQ SUMMARY.

THIS EVENT CONSISTS OF    3 CHANNELS, WITH
   3 FREQUENCY POINTS PER CHANNEL.

RAW DATA FORMAT SPECIFICATIONS

    NUNIT =  5      NDVPC =  1      IFORM =  1
    IFREQ =  0       ISEQ =  0      IOVER =  0

 THE INPUT FORMAT IS:
(F9.4,I4,I4)
 START> 160.                                                             Prompt - enter starting center frequency
```

```
FREQUENCIES IN THIRD OCTAVE, START =      160.000
                                                        Prompt - enter desc for 3 channels
ID,NAME,TYPE,UNITS,RMS:  1,A1,ACC,G2PH                          2 lines/channel

DESC:  First Accelerometer
ID,NAME,TYPE,UNITS,RMS:  2,A2,ACC,G2PH
DESC:  Second Acceleromter
ID,NAME,TYPE,UNITS,RMS:  10,M1,MIC,DBSP
DESC:  First Mic                                        enter data, channel ID, seq #

   0.0012    1    1
   0.5670    1    2
   0.3221    1    3
   0.0034    2    1
   0.4320    2    2
   0.1946    2    3
124.2       10    1
129.1       10    2
128.5       10    3                                     blank line after last data entry
                                                        Vapeps Output
BEGIN DATA PROCESSING

BLANK CARD ENCOUNTERED AFTER     3 GROUPS

          EVENT NAME = DEMO,    CLASS =    0

                 FREQUENCY SUMMARY

  BAND          CENTER        LEADING      TRAILING

   1           160.000        140.000      180.000
   2           200.000        180.000      224.000
   3           250.000        224.000      280.000
          EVENT NAME = DEMO,    CLASS =    0


                 CHANNEL SUMMARY

ID       NAME      TYPE     UNITS        INPUT RMS           COMMENTS

1        A1        ACC      G2PH     0.000000E+00   FIRST ACCELEROMETER
2        A2        ACC      G2PH     0.000000E+00   SECOND ACCELEROMTER
10       M1        MIC      DBSP     0.000000E+00   FIRST MIC

NORMAL TERMINATION -- DATA SAVED ON DAL UNIT   1
 ?
CPU:  DELTA, EXECUTION, RUN =       2.57       2.57       3.73
***CIAU***
```

Example 2
Run Stream ENTERI2

```
enter 1,EXMP,0,5,2,1
In this example, the optional parameters are specified. Enter implements
the values: isec = 0, nin = 5, ipnt = 2, ifat =1.
Thus, data will be entered in 1 section from the terminal and output
will be event desc. plus channel & freq summary and spectral data
3,4,0,-2
2,1,1,0,0
(2E12.4,A4,I4)
20.,10.
M1,MIC,DBSP
CHAMBER MIC
M2,MIC,DBSP
CHAMBER MIC
V1,NNAC,G2PH
X AXIS ACCEL
2.0000E+01  1.1000E+02  M1     1
3.0000E+01  1.1700E+02  M1     2
4.0000E+01  1.2000E+02  M1     3
5.0000E+01  1.2700E+02  M1     4
2.0000E+01  1.0900E+02  M2     1
3.0000E+01  1.2000E+02  M2     2
4.0000E+01  1.2100E+02  M2     3
5.0000E+01  1.2700E+02  M2     4
2.0000E+01  7.5000E-04  V1     1
3.0000E+01  5.2300E-02  V1     2
4.0000E+01  7.2200E-01  V1     3
5.0000E+01  9.2300E-01  V1     4
```

EXAMPLE - 2

```
                    VAPEPS
 (VibroAcoustic Payload Environment Prediction System)
                  Version 5.4
                  System UNIX
              (Released April 1988)

                  Developed by
         LOCKHEED MISSILES & SPACE COMPANY

                  Sponsored by
         NASA/GODDARD SPACE FLIGHT CENTER
                       &
            US AIR FORCE/SPACE DIVISION

      User support and database management by
            JET PROPULSION LABORATORY

              Current Date:   05/05/88
              Current Time:   14:05:46
            Available Core:      20000
            Execution Mode:   Batch
```

?enter 1,EXMP,0,5,2,1	Enter command. Dal unit. Event name
DESC: In this example, the optional parameters are specified. Enter implements DESC: the values: isec = 0, nin = 5, ipnt = 2, ifat =1. DESC: Thus, data will be entered in 1 section from the terminal and output DESC: will be event desc. plus channel & freq summary and spectral data	Description
NCHAN,NFRQ,ITYP,ITCH> 3,4,0,-2 NDVPC,IFORM,IFREQ,ISEQ,IOVER> 2,1,1,0,0	3 data channels, 4 frequency bands, constant bandwidth, 2 line chnl descrip, no rename 2 data values, line;,Data,ID, Sequence, freq and data alternate,seq starts @ 1, no overall format for Data,ID,Sequence
FORMAT: (2E12.4,A4,I4) EVENT NAME = EXMP, CLASS = 0 EVENT DESCRIPTION: IN THIS EXAMPLE, THE OPTIONAL PARAMETERS ARE SPECIFIED. ENTER IMPLEMENTS THE VALUES: ISEC = 0, NIN = 5, IPNT = 2, IFAT =1. THUS, DATA WILL BE ENTERED IN 1 SECTION FROM THE TERMINAL AND OUTPUT WILL BE EVENT DESC. PLUS CHANNEL & FREQ SUMMARY AND SPECTRAL DATA THIS EVENT CONSISTS OF 3 CHANNELS, WITH 4 FREQUENCY POINTS PER CHANNEL. RAW DATA FORMAT SPECIFICATIONS NUNIT = 5 NDVPC = 2 IFORM = 1 IFREQ = 1 ISEQ = 0 IOVER = 0	Vapeps output
THE INPUT FORMAT IS: (2E12.4,A4,I4) START,DF> 20.,10.	Prompt-Enter start center freq and delta

```
LINEAR FREQUENCY VECTOR GENERATED

CENTER FREQUENCY RANGE, DELTA =        20.000      50.000 10.0000

 ID,TYPE,UNITS,RMS: M1,MIC,DBSP
 DESC: First Chamber Mic
 ID,TYPE,UNITS,RMS: M2,MIC,DBSP                                    Prompt- enter desc 3 chnls,2 lines/chnl
 DESC: Second Chamber Mic
 ID,TYPE,UNITS,RMS: V1,NNAC,G2PH
 DESC: X Axis Accelerometer
2.0000E+01  1.1000E+02  M1   1
3.0000E+01  1.1700E+02  M1   2
4.0000E+01  1.2000E+02  M1   3                                     enter Data, Channel ID, Seq #
5.0000E+01  1.2700E+02  M1   4                                    Note data order is freq - spectral data
2.0000E+01  1.0900E+02  M2   1                                    No rename on chnl ID
3.0000E+01  1.2000E+02  M2   2
4.0000E+01  1.2100E+02  M2   3
5.0000E+01  1.2700E+02  M2   4
2.0000E+01  7.5000E-04  V1   1
3.0000E+01  5.2300E-02  V1   2
4.0000E+01  7.2200E-01  V1   3
5.0000E+01  9.2300E-01  V1   4

BLANK CARD ENCOUNTERED AFTER    3 GROUPS                          blank line after last data entry
        EVENT NAME = EXMP,    CLASS =    0                        Vapeps output

              FREQUENCY SUMMARY

 BAND        CENTER       LEADING      TRAILING

  1          20.000       15.000       25.000
  2          30.000       25.000       35.000
  3          40.000       35.000       45.000
  4          50.000       45.000       55.000
        EVENT NAME = EXMP,    CLASS =    0

              CHANNEL SUMMARY

ID     NAME    TYPE    UNITS     INPUT RMS          COMMENTS

M1     M1      MIC     DBSP    0.000000E+00  FIRST CHAMBER MIC
M2     M2      MIC     DBSP    0.000000E+00  SECOND CHAMBER MIC
V1     V1      NNAC    G2PH    0.000000E+00  X AXIS ACCELEROMETER
        EVENT NAME = EXMP,    CLASS =    0

 C.FREQ      M1            M2            V1

 20.0000.110000E+030.109000E+030.750000E-03
 30.0000.117000E+030.120000E+030.523000E-01
 40.0000.120000E+030.121000E+030.722000E+00
 50.0000.127000E+030.127000E+030.923000E+00

NORMAL TERMINATION -- DATA SAVED ON DAL UNIT  1
 ?
CPU: DELTA, EXECUTION, RUN =      2.58      2.58      7.42
***CIAU***
```

Example 3
Run Stream ENTERI3

```
enter 1,EXMN,0.5,2,1
In this example, the optional parameters are specified. Enter implements
the values: isec = 0, nin = 5, ipnt = 2, ifat =1.
Thus, data will be entered in 1 section from the terminal and output
will be event desc. plus channel & freq summary and spectral data
2,8,-1,-2
4,3,0,0,0
(A4,4F10.4,I4)
50.,80.,140.,220.,400.,700.,1200.,2000.
40.,65.,110.,180.,310.,550.,950.,1600.
65.,110.,180.,310.,550.,950.,1600.,2850.
A1,ACC,G2PH
Y AXIS Accelerometer
A2,ACC,G2PH
X AXIS Accelerometer
A1   0.0012    0.5670    0.3221    0.0034    1
A1   0.4320    0.1946    0.0012    0.5670    2
A2   0.4320    0.5670    0.3221    0.0034    1
A2   0.0012    0.1946    0.3221    0.1946    2
```

```
-----------------------------------
EXAMPLE - 3
-----------------------------------
                                   VAPEPS
          (VibroAcoustic Payload Environment Prediction System)
                                Version 5.4
                               System UNIX
                           (Released April 1988)


                                Developed by
                     LOCKHEED MISSILES & SPACE COMPANY

                                Sponsored by
                      NASA/GODDARD SPACE FLIGHT CENTER
                                     &
                         US AIR FORCE/SPACE DIVISION

                  User support and database management by
                          JET PROPULSION LABORATORY

                          Current Date:   05/10/88
                          Current Time:   10:32:55
                        Available Core:      20000
                        Execution Mode:   Batch
?enter 1,EXMN,0,5,2,1                                                         Enter command. Dal unit. Event name
DESC: In this example, the optional parameters are specified. Enter implements
DESC: the values:isec = 0, nin = 5, ipnt = 2, ifat = 1                        Description
DESC: Thus, data will be entered in 1 section from the terminal and output
DESC: will be event desc. plus channel & freq summary and spectral data
NCHAN,NFRQ,ITYP,ITCH> 2,8,-1,-2                                               2 data chnls. 8 freq bands. User spec bands
                                                                              2 line chnl descrip no rename
NDVPC,IFORM,IFREQ,ISEQ,IOVER> 4,3,0,0,0                                       4 data values/line, ID,Data,Seq, no freq data
                                                                              seq starts @ 1, no overall data
FORMAT: (A4,4F10.4,I4)                                                        Format for ID,DATA,SEQ
         EVENT NAME = EXMN,    CLASS =    0

EVENT DESCRIPTION:

IN THIS EXAMPLE, THE OPTIONAL PARAMETERS ARE SPECIFIED. ENTER IMPLEMENTS
THE VALUES:ISEC = 0, NIN = 5, IPNT = 2, IFAT =1.
THUS, DATA WILL BE ENTERED IN 1 SECTION FROM THE TERMINAL AND OUTPUT
WILL BE EVENT DESC. PLUS CHANNEL & FREQ SUMMARY AND SPECTRAL DATA             Vapeps Output

THIS EVENT CONSISTS OF    2 CHANNELS, WITH
   8 FREQUENCY POINTS PER CHANNEL.

RAW DATA FORMAT SPECIFICATIONS

    NUNIT =  5      NDVPC =  4      IFORM =  3
    IFREQ =  0       ISEQ =  0      IOVER =  0

 THE INPUT FORMAT IS:
(A4,4F10.4,I4)

CF=50.,80.,140.,220.,400.,700.,1200.,2000.                                    Enter user spec freq bands
BE=40.,65.,110.,180.,310.,550.,950.,1600.
TL=65.,110.,180.,310.,550.,950.,1600.,2850.
```

```
FREQUENCIES INPUT FROM CARDS

CENTER FREQUENCY RANGE =        50.000     2000.000

 ID,TYPE,UNITS,RMS:  A1,ACC,G2PH                                Prompt- enter desc 2 chnls 2 lines/chnl
 DESC:  Y AXIS Accelerometer
 ID,TYPE,UNITS,RMS:  A2,ACC,G2PH
 DESC:  X AXIS Accelerometer
A1  0.0012    0.5670    0.3221    0.0034    1
A1  0.4320    0.1946    0.0012    0.5670    2                   Enter data, ID,DATA, SEG#
A2  0.4320    0.5670    0.3221    0.0034    1                   No rename on chnl ID
A2  0.0012    0.1946    0.3221    0.1946    2

BEGIN DATA PROCESSING                                          Blank line after last data entry

BLANK CARD ENCOUNTERED AFTER     2 GROUPS                      Vapeps Output
         EVENT NAME = EXMN,    CLASS =    0

                   FREQUENCY SUMMARY

  BAND          CENTER      LEADING     TRAILING

    1           50.000       40.000       65.000
    2           80.000       65.000      110.000
    3          140.000      110.000      180.000
    4          220.000      180.000      310.000
    5          400.000      310.000      550.000
    6          700.000      550.000      950.000
    7         1200.000      950.000     1600.000
    8         2000.000     1600.000     2850.000
         EVENT NAME = EXMN,    CLASS =    0

                   CHANNEL SUMMARY

ID      NAME     TYPE     UNITS       INPUT RMS          COMMENTS

A1      A1       ACC      G2PH     0.000000E+00   Y AXIS ACCELEROMETER
A2      A2       ACC      G2PH     0.000000E+00   X AXIS ACCELEROMETER
         EVENT NAME = EXMN,    CLASS =    0

 C.FREQ       A1            A2

  50.0000.120000E-020.432000E+00
  80.0000.567000E+000.567000E+00
 140.0000.322100E+000.322100E+00
 220.0000.340000E-020.340000E-02
 400.0000.432000E+000.120000E-02
 700.0000.194600E+000.194600E+00
1200.0000.120000E-020.322100E+00
2000.0000.567000E+000.194600E+00

NORMAL TERMINATION -- DATA SAVED ON DAL UNIT  1
 ?
CPU: DELTA, EXECUTION, RUN =      2.68       2.68       3.83
***CIAU***
```

Example 4
Run stream ENTERI4

```
enter 1,t23,0.5,2,0
The bulkhead is a 0.2 inch circular plate with a circular central cutout
reinforced by a ring stiffener flange about 2.6 inches wide.
Non-structural mass: 100 lb guidance, 293 lb payload, 50 lb misc.
The nose cone had a half inch hole for wiring access.
3,19,3,-2
1,4,0,0,0
(A4, I4, E10.3)
31 5
MAVG,NSMC,DBSP
average of 3 reverberant chamber microphones (mic 1, mic 2, mic 3)
A45X,NACC,G2PH
X AXIS STA 18.35 BULKHEAD/GUIDANCE ACCELEROMETER (A21450)
A24X,NACC,G2PH
X AXIS STA 18.35 BULKHEAD ACCELEROMETER (A21240)
MAVG   1 1.244E+02
MAVG   2 1.256E+02
MAVG   3 1.271E+02
MAVG   4 1.286E+02
MAVG   5 1.305E+02
MAVG   6 1.326E+02
MAVG   7 1.349E+02
MAVG   8 1.376E+02
MAVG   9 1.411E+02
MAVG  10 1.446E+02
MAVG  11 1.455E+02
MAVG  12 1.465E+02
MAVG  13 1.476E+02
MAVG  14 1.459E+02
MAVG  15 1.441E+02
MAVG  16 1.426E+02
MAVG  17 1.411E+02
MAVG  18 1.398E+02
MAVG  19 1.381E+02
A45X   1 9.500E-05          A24X   1 5.000E-05
A45X   2 8.500E-05          A24X   2 4.600E-05
A45X   3 1.500E-04          A24X   3 7.000E-05
A45X   4 3.000E-04          A24X   4 1.000E-04
A45X   5 6.000E-04          A24X   5 1.400E-04
A45X   6 1.500E-03          A24X   6 3.400E-04
A45X   7 3.000E-03          A24X   7 8.000E-04
A45X   8 8.000E-04          A24X   8 2.000E-04
A45X   9 1.000E-02          A24X   9 3.000E-03
A45X  10 2.500E-02          A24X  10 8.000E-03
A45X  11 8.000E-03          A24X  11 8.000E-04
A45X  12 1.200E-02          A24X  12 4.000E-03
A45X  13 1.700E-02          A24X  13 2.000E-03
A45X  14 4.500E-03          A24X  14 1.100E-02
A45X  15 2.000E-03          A24X  15 2.000E-03
A45X  16 1.400E-03          A24X  16 1.400E-03
A45X  17 1.000E-03          A24X  17 3.000E-03
A45X  18 8.000E-04          A24X  18 1.600E-03
A45X  19 1.200E-04          A24X  19 1.200E-03
```

```
-------------------------
EXAMPLE - 4
-------------------------

                         VAPEPS
      (VibroAcoustic Payload Environment Prediction System)
                     Version 5.4.1
                   System MASSCOMP/UNIX
                   (Released June 1988)
                                                                    Vapeps Logo

                      Developed by
             LOCKHEED MISSILES & SPACE COMPANY

                      Sponsored by
             NASA/GODDARD SPACE FLIGHT CENTER
                            &
              US AIR FORCE/SPACE DIVISION

         User support and database management by
               JET PROPULSION LABORATORY

     Date:   Friday, August 12, 1988        Time:    1:14:59 PM.
      Execution mode:  Batch        Core Size:  20000 words
                                                                    Enter cmnd, Dal unit 1,Event t23
?enter 1,t23,0,5,2,0                                                1 data section,terminal input.
DESC: The bulkhead is a 0.2 inch circular plate with a circular central cutout    print event,chnl- freq,spectral.
DESC: reinforced by a ring stiffener flange about 2.6 inches wide.
DESC: Non-structural mass: 100 lb guidance, 293 lb payload, 50 lb misc.          Description
DESC: The nose cone had a half inch hole for wiring access.
NCHAN,NFRQ,ITYP,ITCH> 3,19,3,-2                                     3 data chnls,19 freq,1/3 octave.
NDVPC,IFORM,IFREQ,ISEG,IOVER> 1,4,0,0,0                             2 lines/chnl,no rename.
FORMAT: (A4, I4, E10.3)                                             1 data value/line;ID,seq,Data. No
     EVENT NAME = T23 ,   CLASS =   0                              freq in data,seq starts @1,no overall.
                                                                    Format for ID,seq,Data.


EVENT DESCRIPTION:                                                  Vapeps Output.

THE BULKHEAD IS A 0.2 INCH CIRCULAR PLATE WITH A CIRCULAR CENTRAL CUTOUT
REINFORCED BY A RING STIFFNER FLANGE ABOUT 2.6 INCHES WIDE.
NON-STRUCTURAL MASS: 100 LB GUIDANCE, 293 LB PAYLOAD, 50 LB MISC.
THE NOSE CONE HAD A HALF INCH HOLE FOR WIRING ACCESS.


THIS EVENT CONSISTS OF    3 CHANNELS, WITH
  19 FREQUENCY POINTS PER CHANNEL.

RAW DATA FORMAT SPECIFICATIONS

    NUNIT =  5     NDVPC =  1     IFORM =  4
    IFREQ =  0      ISEG =  0     IOVER =  0
```

```
 THE INPUT FORMAT IS:
(A4, I4, E10.3)
 START> 31.5

FREQUENCIES IN THIRD OCTAVE, START =      31.500                Prompt- entr start center freq.

 ID,TYPE,UNITS,RMS:  MAVG,NSMC,DBSP                             Prompt- enter desc for 3 channels
 DESC: average of 3 reverberant chamber microphones (mic 1, mic 2, mic 3)   2 lines/channel.
 ID,TYPE,UNITS,RMS:  A45X,NACC,G2PH
 DESC: X AXIS STA 18.35 BULKHEAD/GUIDANCE ACCELEROMETER (A21450)
 ID,TYPE,UNITS,RMS:  A24X,NACC,G2PH
 DESC: X AXIS STA 18.35 BULKHEAD ACCELEROMETER (A21240)
                                                                Enter data; ID,seq,Data
BEGIN DATA PROCESSING
                                                                blank line after last data entry.

BLANK CARD ENCOUNTERED AFTER    3 GROUPS
         EVENT NAME = T23 ,   CLASS =   0                      Vapeps output.

                FREQUENCY SUMMARY

 BAND        CENTER      LEADING     TRAILING

   1         31.500      28.000      35.500
   2         40.000      35.500      45.000
   3         50.000      45.000      56.000
   4         63.000      56.000      71.000
   5         80.000      71.000      90.000
   6        100.000      90.000     112.000
   7        125.000     112.000     140.000
   8        160.000     140.000     180.000
   9        200.000     180.000     224.000
  10        250.000     224.000     280.000
  11        315.000     280.000     355.000
  12        400.000     355.000     450.000
  13        500.000     450.000     560.000
  14        630.000     560.000     710.000
  15        800.000     710.000     900.000
  16       1000.000     900.000    1120.000
  17       1250.000    1120.000    1400.000
  18       1600.000    1400.000    1800.000
  19       2000.000    1800.000    2240.000
```

```
EVENT NAME = T23 ,    CLASS =    0

               CHANNEL SUMMARY

ID      NAME     TYPE     UNITS       INPUT RMS          COMMENTS

MAVG    MAVG     NSMC     DBSP     0.000000E+00  AVERAGE OF 3 REVERBERANT CHAMBER MICROPHONES (MIC 1, MIC 2, MIC 3)
A45X    A45X     NACC     G2PH     0.000000E+00  X AXIS STA 18.35 BULKHEAD/GUIDANCE ACCELEROMETER (A21450)
A24X    A24X     NACC     G2PH     0.000000E+00  X AXIS STA 18.35 BULKHEAD ACCELEROMETER (A21240)
          EVENT NAME = T23 ,    CLASS =    0

  C.FREQ        MAVG          A45X          A24X

   31.5000.124400E+030.950000E-040.500000E-04
   40.0000.125600E+030.850000E-040.460000E-04
   50.0000.127100E+030.150000E-030.700000E-04
   63.0000.128600E+030.300000E-030.100000E-03
   80.0000.130500E+030.600000E-030.140000E-03
  100.0000.132600E+030.150000E-020.340000E-03
  125.0000.134900E+030.300000E-020.800000E-03
  160.0000.137600E+030.800000E-030.200000E-03
  200.0000.141100E+030.100000E-010.300000E-02
  250.0000.144600E+030.250000E-010.800000E-02
  315.0000.145500E+030.800000E-020.800000E-03
  400.0000.146500E+030.120000E-010.400000E-02
  500.0000.147600E+030.170000E-010.200000E-02
  630.0000.145900E+030.450000E-020.110000E-01
  800.0000.144100E+030.200000E-020.200000E-02
 1000.0000.142600E+030.140000E-020.140000E-02
 1250.0000.141100E+030.100000E-020.300000E-02
 1600.0000.139800E+030.800000E-030.160000E-02
 2000.0000.138100E+030.120000E-030.120000E-02

NORMAL TERMINATION -- DATA SAVED ON DAL UNIT  1
 ?
CPU: DELTA, EXECUTION, RUN =      3.28      3.28      3.95
***CIAU***
```

Example - 5
Run Stream ENTERI5

```
ENTER 1,GLL,0,5,2,0
The Galileo despun section is a magnesium cone with 25 aluminum
stiffeners, 2 magnesium doublers, and 8 aluminum longerons. The cone
is assumed to be a flat plate with a width equal to the height of the
cone and a length equal to the cone circumference at its midpoint.
3,18,3,-2
1,1,0,0,0
(E11.4,A2,I3)
40.0
A1,ACC,G2PH
X AXIS ACCELEROMETER
A2,ACC,G2PH
Y AXIS ACCELEROMETER
A3,ACC,G2PH
Z AXIS ACCELEROMETER
9.3146E-05 A1  1
9.4714E-05 A1  2
4.9288E-03 A1  3
5.9058E-03 A1  4
5.8734E-02 A1  5
6.2909E-02 A1  6
3.3795E-02 A1  7
4.3050E-02 A1  8
2.5052E-02 A1  9
5.6688E-02 A1 10
3.6252E-02 A1 11
3.3321E-02 A1 12
3.4046E-02 A1 13
5.4812E-03 A1 14
9.2013E-03 A1 15
2.1639E-03 A1 16
4.7687E-04 A1 17
3.1655E-04 A1 18
1.0160E-04 A2  1
9.8488E-04 A2  2
8.8365E-03 A2  3
6.6954E-03 A2  4
1.6087E-02 A2  5
3.5381E-02 A2  6
6.4373E-02 A2  7
4.3687E-02 A2  8
2.8187E-02 A2  9
3.0843E-02 A2 10
1.3460E-02 A2 11
7.6581E-03 A2 12
5.9128E-03 A2 13
1.0934E-02 A2 14
3.6732E-02 A2 15
3.9493E-02 A2 16
6.1814E-07 A2 17
1.6562E-03 A2 18
7.4711E-07 A3  1
1.4473E-06 A3  2
4.2278E-05 A3  3
5.2986E-05 A3  4
4.0889E-04 A3  5
4.7656E-04 A3  6
3.1537E-04 A3  7
3.3182E-04 A3  8
1.2759E-04 A3  9
2.4180E-04 A3 10
2.3219E-04 A3 11
2.2942E-04 A3 12
2.1757E-03 A3 13
3.0299E-03 A3 14
1.4160E-03 A3 15
1.5858E-04 A3 16
1.9185E-05 A3 17
3.0276E-06 A3 18
```

```
----------------------------------
EXAMPLE - 5
----------------------------------

                                   VAPEPS
              (VibroAcoustic Payload Environment Prediction System)
                                Version 5.4.1
                             System MASSCOMP/UNIX
                             (Released June 1988)


                                Developed by
                      LOCKHEED MISSILES & SPACE COMPANY

                                Sponsored by
                       NASA/GODDARD SPACE FLIGHT CENTER
                                     &
                         US AIR FORCE/SPACE DIVISION

                    User support and database management by
                           JET PROPULSION LABORATORY

        Date:  Friday, September 16, 1988        Time:   8:44:08 AM.
           Execution mode:  Batch         Core Size:  20000 words
 ?ENTER 1,GLL,0,5,2,0                                                       Enter Cmnd,DAL 1,Event GLL, 1 data sect,
 DESC: The Galileo despun section is a magnesium cone with 25 aluminum      Terminal input,Print all.
 DESC: stiffeners, 2 magnesium doublers, and 8 aluminum longerons. The cone
 DESC: is assumed to be a flat plate with a width equal to the height of the Description
 DESC: cone and a length equal to the cone circumference at its midpoint.
 NCHAN,NFRG,ITYP,ITCH> 3,18,3,-2                                            3 Chnls,18 Freqs,1/3 Octave,2 lines/Chnl,
 NDVPC,IFORM,IFREQ,ISEQ,IOVER> 1,1,0,0,0                                    1 data value/line, Data,ID,Seq,
 FORMAT: (E11.4,A2,I3)                                                      Format for Data,ID,Seq.
          EVENT NAME = GLL ,    CLASS =    0


EVENT DESCRIPTION:                                                          Vapeps Output

THE GALILEO DESPUN SECTION IS A MAGNESIUM CONE WITH 25 ALUMINUM
STIFFNERS, 2 MAGNESIUM DOUBLERS, AND 8 ALUMINUM LONGERONS. THE CONE
IS ASSUMED TO BE A FLAT PLATE WITH A WIDTH EQUAL TO THE HEIGHT OF THE
CONE AND A LENGTH EQUAL TO THE CONE CIRCUMFERENCE AT ITS MIDPOINT.


THIS EVENT CONSISTS OF    3 CHANNELS, WITH
  18 FREQUENCY POINTS PER CHANNEL.

RAW DATA FORMAT SPECIFICATIONS

    NUNIT =  5     NDVPC =  1     IFORM =  1
    IFREQ =  0      ISEQ =  0     IOVER =  0
```

```
 THE INPUT FORMAT IS:
(E11.4,A2,I3)
 START> 40.0                                                       Prompt Enter start Frequency

FREQUENCIES IN THIRD OCTAVE, START =      40.000

 ID,TYPE,UNITS,RMS:  A1,ACC,G2PH                                   Prompt - Enter desc for 3 channels
 DESC:  X AXIS ACCELEROMETER                                       2 lines/ channel
 ID,TYPE,UNITS,RMS:  A2,ACC,G2PH
 DESC:  Y AXIS ACCELEROMETER
 ID,TYPE,UNITS,RMS:  A3,ACC,G2PH
 DESC:  Z AXIS ACCELEROMETER

BEGIN DATA PROCESSING
                                                                   Enter Data: Data, ID, Seq

BLANK CARD ENCOUNTERED AFTER    3 GROUPS                           Blank line after last data entry
          EVENT NAME = GLL ,   CLASS =   0

                FREQUENCY SUMMARY                                  Vapeps Output

  BAND        CENTER       LEADING      TRAILING

    1         40.000        35.500        45.000
    2         50.000        45.000        56.000
    3         63.000        56.000        71.000
    4         80.000        71.000        90.000
    5        100.000        90.000       112.000
    6        125.000       112.000       140.000
    7        160.000       140.000       180.000
    8        200.000       180.000       224.000
    9        250.000       224.000       280.000
   10        315.000       280.000       355.000
   11        400.000       355.000       450.000
   12        500.000       450.000       560.000
   13        630.000       560.000       710.000
   14        800.000       710.000       900.000
   15       1000.000       900.000      1120.000
   16       1250.000      1120.000      1400.000
   17       1600.000      1400.000      1800.000
   18       2000.000      1800.000      2240.000
```

```
        EVENT NAME = GLL ,    CLASS =    0

                CHANNEL SUMMARY

ID      NAME     TYPE     UNITS      INPUT RMS           COMMENTS

A1      A1       ACC      G2PH     0 000000E+00  X AXIS ACCELEROMETER
A2      A2       ACC      G2PH     0 000000E+00  Y AXIS ACCELEROMETER
A3      A3       ACC      G2PH     0 000000E+00  Z AXIS ACCELEROMETER
         EVENT NAME = GLL ,    CLASS =    0

 C FREQ        A1            A2            A3

  40 0000. 931460E-040. 101600E-030. 747110E-06
  50 0000. 947140E-040. 984880E-030. 144730E-05
  63 0000. 492880E-020. 883650E-020. 422780E-04
  80 0000. 590580E-020. 669540E-020. 529860E-04
 100 0000. 587340E-010. 160870E-010. 408890E-03
 125 0000. 629090E-010. 353810E-010. 476560E-03
 160 0000. 337950E-010. 643730E-010. 315370E-03
 200 0000. 430500E-010. 436870E-010. 331820E-03
 250 0000. 250520E-010. 281870E-010. 127590E-03
 315 0000. 566880E-010. 308430E-010. 241800E-03
 400 0000. 362520E-010. 134600E-010. 232190E-03
 500 0000. 333210E-010. 765810E-020. 229420E-03
 630 0000. 340460E-010. 591280E-020. 217570E-02
 800 0000. 548120E-020. 109340E-010. 302990E-02
1000 0000. 920130E-020. 367320E-010. 141600E-02
1250 0000. 216390E-020. 394930E-010. 158580E-03
1600 0000. 476870E-030. 618140E-060. 191850E-04
2000 0000. 316550E-030. 165620E-020. 302760E-05

NORMAL TERMINATION -- DATA SAVED ON DAL UNIT  1
CPU  DELTA, EXECUTION, RUN =      3 35       3 35       4 07
***CIAU***
```

4.2 THE PREP PROCESSOR

Examples 4 and 5 are continued in this section. After the vibroacoustic data is stored in the ENTER processor, the PREP processor is used to define the database event and standardize the raw data input from ENTER. The PREP processor command flow-chart may be referenced for the sequence of commands used. The input run streams for these two examples are designated as PREPI4 and PREPI5, respectively. These run streams precede the VAPEPS output of the PREP processor.

Example 4
Run stream PREPI4

```
PREP 1, t23
BOOK
PROC GDC_TESTLAB, TOMAHAWK, TLAM, T23
CONT GDC, TOMAHAWK, TLAM, T23
COGN JCMP, TOMAHAWK, TLAM, T23
DATE 09/08/82
LOCA SAN_DIEGO, HARBOR_DRIVE, TEST_CHAMBER, T23
EVENT GROUND, REVERBERANT, ACCEPTANCE, 157_dB_OASPL
VEHICLE CRUISE_MSL, TOMAHAWK, TLAM, T23
DESC
1 RPT 76A7575 T-23 MODIFIED ACOUSTIC ACCEPTANCE TEST BGM-109A/G 9/27/82.
2 QUALIFICATION TEST VEHICLE IN TLAM CONFIGURATION, W-80 SIMULATED WARHEAD.
3 TEST LEVEL 157 dB OASPL.
4
DONE
LIST
DONE
CHECK
CONF
INPUT
$, FUSE, FUSELAGE, TLAM
FUSE, NOSE, NOSECONE, TLAM
END
LIST
DONE
MODULES
DAMO DPA4
DESC N12340, DFOONO, NOSE
EXTA HARBOR_DRIVE, TEST_CHAMBER, CELL
P* TYPE=1, RHO=1. 12E-7, AP=2. E+5, V=1. E+6, AAC=0. 02, CO=13200.
C* MAVG
SKIN FIBERGLASS, NOSECONE, CONE
P* TYPE=3, RHO=2. 07E-4, RHOS=8. 28E-5, ASMS=0. , H=0. 4, D=20. 37
P* BL=18. 35, ALX=18. 35, ALY=64. , PATA=64. , AP=875. , BETA=16.
P* E=2. 5E+6, DLF=0. 05, CL=1. 15E+5
INTA t23, NOSE_CAVITY, NCAV
P* TYPE=1, RHO=1. 12E-7, AP=2600. , V=700. , AAC=0. 02, CO=13200.
MONT STA_18. 35, BULKHEAD, BULK
P* TYPE=3, RHO=2. 617E-4, ASMS=1. 15, H=0. 2, ALX=18.
P* ALY=18. , PATA=105. , BJL=64. , AP=171. , E=10. 5E+6
P* DLF=0. 05, CL=2. 1E+5
C* A24X, A45X
DONE
ATTACH DPA4, NOSE, FUSE
DUMP
LIST
DAMO DPB4
DESC N12300, DF0000, FUSE
EXTA HARBOR_DRIVE, TEST_CHAMBER, CELL
P* TYPE=1, RHO=1. 12E-7, AP=2. E+5, V=1. E+6, AAC=0. 02, CO=13200.
C* MAVG
SKIN FORWARD, FUSELAGE, CYLIN
P* TYPE=2, RHO=2. 617E-4, RHOS=2. 09E-5, ASMS=0. 0508, H=0. 08
P* D=20. 37, BL=34. 1, ALX=34. 1, ALY=64. , PATA=128. , AP=2182.
P* E=10. 5E+6, DLF=0. 05, CL=2. 10E+5
INTA t23, FUSE_CAVITY, FCAV
P* TYPE=1, RHO=1. 12E-7, AP=3250. , V=8460. , AAC=0. 02, CO=13200.
DONE
ATTACH DPB4, FUSE, FUSE
DUMP
LIST
SAVE
DONE
DONE
TOC 1
```

EXAMPLE - 4 (cont)

```
                          VAPEPS
   (VibroAcoustic Payload Environment Prediction System)
                        Version 5.4
                        System UNIX
                    (Released April 1988)

                        Developed by
               LOCKHEED MISSILES & SPACE COMPANY

                        Sponsored by
               NASA/GODDARD SPACE FLIGHT CENTER
                             &
                 US AIR FORCE/SPACE DIVISION

          User support and database management by          Vapeps Logo
                 JET PROPULSION LABORATORY

                  Current Date:   06/28/88
                  Current Time:   13:24:25
                Available Core:      20000
                Execution Mode:   Batch
?PREP 1,t23,0                                              Prep Cmnd, Dal 1, event t23, 1 data sect Enter
PREP>BOOK                                                  Prep SubCmnd BooK - to enter key words
BOOK>PROC GDC_TESTLAB,TOMAHAWK,TLAM,T23
BOOK>CONT GDC,TOMAHAWK,TLAM,T23
BOOK>COGN JCMP,TOMAHAWK,TLAM,T23
BOOK>DATE 09/08/82
BOOK>LOCA SAN_DIEGO,HARBOR_DRIVE,TEST_CHAMBER,T23
BOOK>EVENT GROUND,REVERBERANT,ACCEPTANCE,157_dB_OASPL
BOOK>VEHICLE CRUISE_MSL,TOMAHAWK,TLAM,T
BOOK>DESC
DESC>1 RPT 76A7575 T-23 MODIFIED ACOUSTIC ACCEPTANCE TEST BGM-109A/G 9/27/82.
DESC>2 QUALIFICATION TEST VEHICLE IN TLAM CONFIGURATION, W-80 SIMULATED WARHEAD.
DESC>3 TEST LEVEL 157 dB OASPL.
DESC>4
DESC>DONE                                                  Exit Desc
BOOK>LIST                                                  List Book Contents
 PROCESSI    GDC_TESTLAB  TOMAHAWK      TLAM          T23  Vapeps response
 CONTRACT    GDC          TOMAHAWK      TLAM          T23
 COGNIZNT    JCMP         TOMAHAWK      TLAM          T23
 DATE        09/08/82
 EVENT       GROUND       REVERBERANT   ACCEPTANCE    157_DB_OASPL
 LOCATION    SAN_DIEGO    HARBOR_DRIVE  TEST_CHAMBER  T23
 VEHICLE     CRUISE_MSL   TOMAHAWK      TLAM          T23

RPT 76A7575 T-23 MODIFIED ACOUSTIC ACCEPTANCE TEST BGM-109A/G 9/27/82.
QUALIFICATION TEST VEHICLE IN TLAM CONFIGURATION, W-80 SIMULATED WARHEAD
TEST LEVEL 157 DB OASPL.

BOOK>DONE                                                  exit Book
  BOOK DATA SAVED
```

```
PREP>CHECK                                                      Collects and converts Enter data
PREP>CONF                                                       Prep SubCmnd- to enter configuration tree
CONF>INPUT                                                      Config SubCmnd-to input tree data
LTGSME>$, FUSE, FUSELAGE, TLAM                                  tree data
LTGSME>FUSE, NOSE, NOSECONE, TLAM
LTGSME>END                                                      end data
CONF>LIST                                                       List Configuration tree
  1:  $     FUSE  FUSELAGE      TLAM                            Vapeps response
  2:  FUSE  NOSE  NOSECONE      TLAM
CONF>DONE                                                       Exit CONF
WARNING, THE FOLLOWING GENERIC  NAMES ARE NOT IN THE MASTER DIRECTORY   Warning issued because names are yet to be
FUSELAGE      NOSECONE                                          defined by DICTIONARY(See Dict-Admin Procsr)
WARNING, THE FOLLOWING SPECIFIC NAMES ARE NOT IN THE MASTER DIRECTORY
TLAM          TLAM
NO ERRORS
PREP>MODULES                                                        Prep SubCmnd- to enter SEA Model data
MODS>DAMO DPA4                                                      input at MODULES prompt
DAMO>DESC N12340, DFOONO, NOSE                                      DAMO prompt-SubCmnd DESC for descrptn
DAMO>EXTA HARBOR_DRIVE, TEST_CHAMBER, CELL                          DAMO prompt-SubCmnd EXTA for data
EXTA>P* TYPE=1, RHO=1. 12E-7, AP=2. E+5, V=1. E+6, AAC=0. 02, CO=13200.
EXTA>C* MAVG                                                      Enter SEA Model parameters
EXTA>SKIN FIBERGLASS, NOSECONE, CONE
SKIN>P* TYPE=3, RHO=2. 07E-4, RHOS=8. 28E-5, ASMS=0. , H=0. 4, D=20. 37
SKIN>P* BL=18. 35, ALX=18. 35, ALY=64. , PATA=64. , AP=875. , BETA=16.
SKIN>P* E=2. 5E+6, DLF=0. 05, CL=1. 15E+5
SKIN>INTA t23, NOSE_CAVITY, NCAV
INTA>P* TYPE=1, RHO=1. 12E-7, AP=2600. , V=700. , AAC=0. 02, CO=13200.
INTA>MONT STA_18. 35, BULKHEAD, BULK
MONT>P* TYPE=3, RHO=2. 617E-4, ASMS=1. 15, H=0. 2, ALX=18.
MONT>P* ALY=18. , PATA=105. , BJL=64. , AP=171. , E=10. 5E+6
MONT>P* DLF=0. 05, CL=2. 1E+5
MONT>C* A24X, A45X
MONT>DONE
MODS>ATTACH DPA4, NOSE, FUSE                                    MODS Subcmnd-attach mod to config tree
MODS>DUMP                                                       Long list- event's MODULES table

  1 DPA4 NOSE FUSE        0   0   0        N12340 DFOONO NOSE        Vapeps response

EXTA    0     1    0    0    0    0       HARBOR_DRIVE TEST_CHAMBER CELL
SKIN    0     0    0    0    0    0       FIBERGLASS NOSECONE CONE
INTA    0     0    0    0    0    0       T23 NOSE_CAVITY NCAV
MONT    0     2    0    0    0    0       STA_18. 35 BULKHEAD BULK
INST    0     0    0    0    0    0
FRAM    0     0    0    0    0    0

MODS>LIST                                                       A shorter listing of event's module table

    DAMO CNFG ZONE GLBL IX  IY  IZ          DESCRIPTIONS

  1 DPA4 NOSE FUSE        0   0   0        N12340 DFOONO NOSE
```

```
MODS>DAMO DPB4
DAMO>DESC N12300, DF0000, FUSE
DAMO>EXTA HARBOR_DRIVE, TEST_CHAMBER, CELL
EXTA>P* TYPE=1, RHO=1. 12E-7, AP=2. E+5, V=1. E+6, AAC=0. 02, CO=13200.
EXTA>C* MAVG
EXTA>SKIN FORWARD, FUSELAGE, CYLIN
SKIN>P* TYPE=2, RHO=2. 617E-4, RHOS=2. 09E-5, ASMS=0. 0508, H=0. 08
SKIN>P* D=20. 37, BL=34. 1, ALX=34. 1, ALY=64. , PATA=128. , AP=2182.
SKIN>P* E=10. 5E+6, DLF=0. 05, CL=2. 10E+5
SKIN>INTA t23, FUSE_CAVITY, FCAV
INTA>P* TYPE=1, RHO=1. 12E-7, AP=3250. , V=8460. , AAC=0. 02, CO=13200.
INTA>DONE
MODS>ATTACH DPB4, FUSE, FUSE
MODS>DUMP
```

MODU subcmnd DAMO to create 2nd data module in Event module table
DAMO subcmnds DESC, EXTA for data inputs.

SEA Model Inputs

Exit INTA Vapeps prompts with MODS

Long list data module

Vapeps response

```
    1 DPA4 NOSE FUSE        0  0  0      N12340 DFOONO NOSE

EXTA     0     1    0    0    0    0     HARBOR_DRIVE TEST_CHAMBER CELL
SKIN     0     0    0    0    0    0     FIBERGLASS NOSECONE CONE
INTA     0     0    0    0    0    0     T23 NOSE_CAVITY NCAV
MONT     0     2    0    0    0    0     STA_18. 35 BULKHEAD BULK
INST     0     0    0    0    0    0
FRAM     0     0    0    0    0    0

    2 DPB4 FUSE FUSE        0  0  0      N12300 DF0000 FUSE

EXTA     0     1    0    0    0    0     HARBOR_DRIVE TEST_CHAMBER CELL
SKIN     0     0    0    0    0    0     FORWARD FUSELAGE CYLIN
INTA     0     0    0    0    0    0     T23 FUSE_CAVITY FCAV
MONT     0     0    0    0    0    0
INST     0     0    0    0    0    0
FRAM     0     0    0    0    0    0


MODS>LIST

     DAMO CNFG ZONE QLBL  IX  IY  IZ          DESCRIPTIONS

   1 DPA4 NOSE FUSE        0   0   0      N12340 DFOONO NOSE
   2 DPB4 FUSE FUSE        0   0   0      N12300 DF0000 FUSE
```

Short list data module

Vapeps response

```
MODS>SAVE
WARNING, THE FOLLOWING TERMS ARE NOT IN THE MASTER GLOSSARY:
 NOSE          HARBOR_DRIVE TEST_CHAMBER CELL         FIBERGLASS
 NOSECONE      CONE         T23          NOSE_CAVITY  NCAV
 STA_18.35     BULKHEAD     BULK         DF0000       FUSE
 FORWARD       FUSELAGE     CYLIN        FUSE_CAVITY  FCAV
 0 ERRORS IN   2 MODULES,   4 CHANNELS, DESC LENGTH =  23
 SAVE COMPLETE
MODS>DONE
PREP>DONE
UPDATING PREP STATUS
?TOC 1
TABLE OF CONTENTS FOR DAL UNIT  1     DAL001

SEQ    RR   DATE   TIME  E   WORDS    NR    NC  T ELN    VER      C1   C2
  1   -16 880628 131805  0      57    19     3  1 SPDT   T23      0    0
  2   -20 880628 131805  0      69    23     3  4 CHAN   T23      0    0
  3   -24 880628 131805  0      80    80     1  4 EVNT   T23      0    0
  4   -28 880628 131805  0      57    19     3  1 FREQ   T23      0    0
  5    32 880628 132335  0      57    19     3  1 SPDT   T23      0    0
  6    36 880628 132335  0      69    23     3  4 CHAN   T23      0    0
  7    40 880628 132335  0      80    80     1  4 EVNT   T23      0    0
  8    44 880628 132335  0      57    19     3  1 FREQ   T23      0    0
  9    48 880628 132427  0     100   100     1  0 PREP   T23      0    0
 10    52 880628 132428  0     108   108     1  4 BOOK   T23      0    0
 11    56 880628 132428  0      72    72     1  4 RMRK   T23      0    0
 12    60 880628 132429  0      93    31     3  1 DBDT   T23      0    0
 13    64 880628 132429  0      54    18     3  4 CDSC   T23      0    0
 14    68 880628 132429  0      24     3     8  1 PCHN   T23      0    0
 15    76 880628 132430  0       8     2     4  4 CFDF   T23      0    0
 16    80 880628 132430  0      12     6     2  4 CFGS   T23      0    0
 17    84 880628 132430  0       6     6     1  0 CFBT   T23      0    0
 18    88 880628 132433  0     128    64     2  0 DMDF   T23      0    0
 19    92 880628 132433  0     360   180     2  1 DMPT   T23      0    0
 20   104 880628 132433  0      69    69     1  4 DMDT   T23      0    0
 21   108 880628 132433  0      20     4     5  4 DMCD   T23      0    0
CPU: DELTA, EXECUTION, RUN =    7.18      7.18      8.28
***CIAU***
```

Warning issued terms yet to be defined by DICT
(See DICT-ADMIN Processor)

exit MODULES
exit PREP

list table contents DAL unit 1
Vapeps response

Example - 5
Run stream PREPI5

```
PREP 1. GLL.0
BOOK
PROC JPL.GALILEO.DESPUN_SEC.GLL
CONT JPL.GALILEO.DESPUN_SEC.GLL
COGN JPL.GALILEO.DESPUN_SEC.GLL
DATE 09/24/84
LOCA PASADENA.JPL.ACOUSTIC.CHAMBER
EVENT GROUND.REVERBERANT.PROTOFLIGHT.SYSTEM_LEVEL
VEHICLE SHUTTLE.ATLANTIS.GALILEO.STS-34
DESC
1 REPORT JPL D-1936.FEBRUARY.1985 GALILEO (GLL) PROTOFLIGHT
2 SPACECRAFT ACOUSTIC TEST REPORT
3 FINAL SYSTEM LEVEL TEST, COMPLETE SPACECRAFT
4 142 dB OASPL
DONE
LIST
DONE
CHECK
CONF
INPUT
$.DESP.DESPUN.GLL_DESP_SEC
END
DONE
MODULES
DAMO DPA4
DESC N12300.DFN000.GLL_DESP_SEC
EXTA JPL_ACO_CHM.NITROGEN.REVERBERANT
P* TYPE=1.RHO=1.148E-7.AP=4.130E+5.V=1.773E+7.AAC=1.5E-2.CO=1.376E+4
SKIN GLL_DSP_CONE.MAGNESIUM.STIFFENERS
P* TYPE=5.RHO=1.246E-4.RHOS=1.172E-5.ASMS=.919.H=.1477
P* D=55..BL=12..ALX=160..ALY=12..PATA=320..AP=1874.
P* E=4.890E+6.DLF=.05.C1=1.980E+5
C* A1.A2.A3
INTA DSP_CONE_INT.NITROGEN.REVERBERANT
P* TYPE=1.RHO=1.148E-7.AP=2.2802E+4.V=4.02132E+5.AAC=.015.CO=1.376E+4
DONE
ATTACH DPA4.DESP.DESP
DUMP
LIST
SAVE
DONE
DONE
```

EXAMPLE - 5 (cont)

```
                              VAPEPS
        (VibroAcoustic Payload Environment Prediction System)
                          Version 5.4.1
                       System MASSCOMP/UNIX
                       (Released June 1988)


                           Developed by
                 LOCKHEED MISSILES & SPACE COMPANY

                           Sponsored by
                 NASA/GODDARD SPACE FLIGHT CENTER
                                &
                    US AIR FORCE/SPACE DIVISION

             User support and database management by
                    JET PROPULSION LABORATORY

     Date:  Thursday, October 27, 1988        Time:    3:06:50 PM.
        Execution mode:  Batch          Core Size:  20000 words
?PREP 1, GLL,0                                                        Prep Cmnd,DA1 1,event GLL,1 data sect-Enter
PREP>BOOK                                                             Prep SubCmnd to enter keywords
BOOK>PROC JPL,GALILEO,DESPUN_SEC,GLL
BOOK>CONT JPL,GALILEO,DESPUN_SEC,GLL
BOOK>COGN JPL,GALILEO,DESPUN_SEC,GLL                                  Book SubCmnds
BOOK>DATE 09/24/84
BOOK>LOCA PASADENA,JPL,ACOUSTIC,CHAMBER
BOOK>EVENT GROUND,REVERBERANT,PROTOFLIGHT,SYSTEM_LEVEL
BOOK>VEHICLE SHUTTLE,ATLANTIS,GALILEO,STS-34
BOOK>DESC
DESC>1 REPORT JPL D-1936,FEBRUARY,1985 GALILEO (GLL) PROTOFLIGHT
DESC>2 SPACECRAFT ACOUSTIC TEST REPORT
DESC>3 FINAL SYSTEM LEVEL TEST, COMPLETE SPACECRAFT
DESC>4 142 dB OASPL
DESC>DONE                                                             Exit Desc
BOOK>LIST                                                             Short listing of Book contents
 PROCESSI     JPL          GALILEO      PROTOFLIGHT  GLL
 CONTRACT     JPL          GALILEO      DESPUN_SEC   GLL
 COGNIZNT     JPL          GALILEO      DESPUN_SEC   GLL              Vapeps response
 DATE         09/24/84
 EVENT        GROUND       REVERBERANT  PROTOFLIGHT  SYSTEM_LEVEL
 LOCATION     PASADENA     JPL          ACOUSTIC     CHAMBER
 VEHICLE      SHUTTLE      ATLANTIS     GALILEO      STS-34


REPORT JPL D-1936,FEBRUARY,1985 GALILEO (GLL) PROTOFLIGHT
SPACECRAFT ACOUSTIC TEST REPORT
FINAL SYSTEM LEVEL TEST, COMPLETE SPACECRAFT
142 DB OASPL                                                          Exit Book
 BOOK>DONE
   BOOK DATA SAVED
```

```
PREP>CHECK                                                                         Collect & convert Enter data
PREP>CONF                                                                          SubCmnd to enter Config tree
CONF>INPUT                                                                         Config Subcmnd to input data
LTGSME>$, DESP, DESPUN, GLL_DESP_SEC                                               enter config data
LTGSME>END
CONF>DONE                                                                          Exit Config
WARNING, THE FOLLOWING GENERIC  NAMES ARE NOT IN THE MASTER DIRECTORY              Warning- terms not yet defined(see DICT-ADMIN)
DESPUN
WARNING, THE FOLLOWING SPECIFIC NAMES ARE NOT IN THE MASTER DIRECTORY
GLL_DESP_SEC
NO ERRORS
PREP>MODULES
MODS>DAMO DPA4                                                                     SubCmnd to enter SEA model data
DAMO>DESC N12300, DFN000, GLL_DESP_SEC
DAMO>EXTA JPL_ACO_CHM, NITROGEN, REVERBERANT
EXTA>P* TYPE=1, RHO=1. 148E-7, AP=4. 130E+5, V=1. 773E+7, AAC=1. 5E-2, CO=1. 376E+4
EXTA>SKIN GLL_DSP_CONE, MAGNESIUM, STIFFENERS
SKIN>P* TYPE=5, RHO=1. 246E-4, RHOS=1. 172E-5, ASMS=. 919, H=. 1477                SEA Model data
SKIN>P* D=55. , BL=12. , ALX=160. , ALY=12. , PATA=320. , AP=1874.
SKIN>P* E=4. 890E+6, DLF=. 05, C1=1. 980E+5
SKIN>C* A1, A2, A3
SKIN>INTA DSP_CONE_INT, NITROGEN, REVERBERANT
INTA>P* TYPE=1, RHO=1. 148E-7, AP=2. 2802E+4, V=4. 02132E+5, AAC=. 015, CO=1. 376E+4
INTA>DONE                                                                          Exit Inta
MODS>ATTACH DPA4, DESP, DESP                                                       Attach data module to Config tree
MODS>DUMP                                                                          Long list data module

    1 DPA1 DESP IUS          0   0   0       DESP IUS GLL

EXTA     0     0     0     0     0     0     JPL TEST_CHAMBER CELL
SKIN     0     3     0     0     0     0     DESPUN UPAD IUS                       Vapeps response
INTA     0     0     0     0     0     0     GLL CAVITY DESP
MONT     0     0     0     0     0     0
INST     0     0     0     0     0     0
FRAM     0     0     0     0     0     0

    2 DPA4 DESP DESP         0   0   0       N12300 DFN000 GLL_DESP_SEC

EXTA     0     0     0     0     0     0     JPL_ACO_CHM NITROGEN REVERBERA
SKIN     0     3     0     0     0     0     GLL_DSP_CONE MAGNESIUM STIFFEN
INTA     0     0     0     0     0     0     DSP_CONE_INT NITROGEN REVERBER
MONT     0     0     0     0     0     0
INST     0     0     0     0     0     0
FRAM     0     0     0     0     0     0
```

```
MODS>LIST                                                          Short Listing of data module

     DAMO CNFG ZONE GLBL IX IY IZ          DESCRIPTIONS

    1 DPA1 DESP IUS        0  0  0       DESP IUS GLL
    2 DPA4 DESP DESP       0  0  0       N12300 DFN000 GLL_DESP_SEC

 MODS>SAVE                                                         Save module table
WARNING, THE FOLLOWING TERMS ARE NOT IN THE MASTER GLOSSARY:
  DESP          IUS           GLL           JPL           TEST_CHAMBER
  CELL          DESPUN        UPAD          GLL_DESP_SEC JPL_ACO_CHM
  REVERBERANT  GLL_DSP_CONE STIFFENERS    DSP_CONE_INT                Terms yet to be defined.
  0 ERRORS IN   2 MODULES,    6 CHANNELS, DESC LENGTH =  19           (see DICT- ADMIN Processor)
  SAVE COMPLETE
 MODS>DONE                                                          Exit Mods
 PREP>DONE                                                          Exit Prep
 UPDATING PREP STATUS
CPU: DELTA, EXECUTION, RUN =      5.38       5.38       6.03
***CIAU***
```

4.3 THE DICTIONARY AND ADMINISTRATION PROCESSORS

Examples 4 and 5 are continued in this section. After the event is PREPed, these processors are used to transmit the event to the local Database Master File. The command flow for these two processors may be referenced for the sequence of commands. The input run streams for these two examples are designated as ADMINI4 and ADMINI5, respectively. These run streams use the command inputs: fname 13,'DBT' and fname 15,'DICTIONARY.DAL' to establish pseudo local Database Master Files and Dictionaries for these events. These pseudo files may be accessed without permission of the Database Administrator. The commands :run=event t23 all unit=1, and run=event GLL all unit=1, respectively, were used to print the events for these two examples.

On the initial callup of the Dictionary and Administration Processors, VAPEPS will require definitions of the terms in the data module. The event cannot be saved until these terms are defined for the data dictionary. To illustrate this phase of the process of creating a database, two examples of using the dictionary are provided in Appendix D. These two examples, which relate to Examples 4 and 5 of the text, demonstrate the method of defining terms for the data dictionary. These examples should be reviewed prior to continuing with the text Examples 4 and 5 wherein all terms for the data module have been defined.

Example 4
Run stream ADMINI4

```
fname 13,'DBT'
fname 15,'DICTIONARY.DAL'
run=padmin 1,t23
dictionary/preadmin 1,t23
list
done
admin
save 1,t23
done
TOC 1
run=event t23 all unit=1
end
```

EXAMPLE - 4 (cont)

```
                              VAPEPS
         (VibroAcoustic Payload Environment Prediction System)
                          Version 5.4.1
                       System MASSCOMP/UNIX
                       (Released June 1988)

                           Developed by
                 LOCKHEED MISSILES & SPACE COMPANY                    
                           Sponsored by
                  NASA/GODDARD SPACE FLIGHT CENTER
                                &
                     US AIR FORCE/SPACE DIVISION
                                                                      Vapeps Logo
              User support and database management by
                     JET PROPULSION LABORATORY

      Date:  Friday, August 19, 1988       Time:    1:16:51 PM.
        Execution mode:  Batch        Core Size:  20000 words
 ?fname 13,'DBT'                                                      create temp data base file DBT
 ?fname 15,'DICTIONARY.DAL'                                           create temp DICTIONARY.DAL file
 ?run=padmin 1,t23                                                    Vapeps command-precedes DICT  ADMIN
 ?dictionary/preadmin 1,t23                                           Command to enter Dictionary interface
Welcome to Data Dictionary version 1.0                                Vapeps reponse
Dictionary > list                                                     Vapeps Dictionary prompt. Define words,
Word $$$$ not found.                                                  then list.
Dictionary > done                                                     Exit Dictionary
ACCEPTANCE     CRUISE_MSL     QDC            QDC_TESTLAB    GROUND
HARBOR_DRIVE   JCMP           REVERBERANT    SAN_DIEGO      TEST_CHAMBER
TLAM           TOMAHAWK
Leaving Data Dictionary.
 ?admin
 ADMIN>save 1,t23                                                     Vapeps prompt, call ADMIN
 SAVE THE WORLD                                                       Vapeps prompt, save event
THAT WAS EVENT NUMBER   1
 ADMIN>done                                                           Exit ADMIN processor
 ?TOC 1                                                               Vapeps prompt, list DAL unit 1
TABLE OF CONTENTS FOR DAL UNIT  1      DAL001
                                                                      Vapeps response
SEG    RR   DATE   TIME  E  WORDS   NR   NC  T ELN    VER    C1   C2
  1   -16 880705 135001  0     57   19    3  1 SPDT   T23     0    0
  2   -20 880705 135001  0     69   23    3  4 CHAN   T23     0    0
  3   -24 880705 135001  0     80   80    1  4 EVNT   T23     0    0
  4   -28 880705 135001  0     57   19    3  1 FREQ   T23     0    0
  5    32 880705 135040  0    100  100    1  0 PREP   T23     0    0
  6    36 880705 135040  0    108  108    1  4 BOOK   T23     0    0
  7    40 880705 135040  0     72   72    1  4 RMRK   T23     0    0
  8    44 880705 135042  0     93   31    3  1 DBDT   T23     0    0
  9    48 880705 135042  0     54   18    3  4 CDSC   T23     0    0
 10    52 880705 135042  0     24    3    8  1 PCHN   T23     0    0
 11    60 880705 135043  0      8    2    4  4 CFDF   T23     0    0
 12    64 880705 135043  0     12    6    2  4 CFGS   T23     0    0
 13    68 880705 135043  0      6    6    1  0 CFBT   T23     0    0
 14    72 880705 135046  0    128   64    2  0 DMDF   T23     0    0
 15    76 880705 135046  0    360  180    2  1 DMPT   T23     0    0
 16    88 880705 135046  0     69   69    1  4 DMDT   T23     0    0
 17    92 880705 135046  0     20    4    5  4 DMCD   T23     0    0
```

18	-100	880705	140320	0	111	111	1	4	WORD	T23	0	0
19	-104	880705	140320	0	37	37	1	0	AUTH	T23	0	0
20	-108	880705	143013	0	111	111	1	4	WORD	T23	0	0
21	-112	880705	143013	0	37	37	1	0	AUTH	T23	0	0
22	-116	880705	143335	0	111	111	1	4	WORD	T23	0	0
23	-120	880705	143336	0	37	37	1	0	AUTH	T23	0	0
24	-124	880705	150039	0	111	111	1	4	WORD	T23	0	0
25	-128	880705	150039	0	37	37	1	0	AUTH	T23	0	0
26	-132	880705	151518	0	111	111	1	4	WORD	T23	0	0
27	-136	880705	151518	0	37	37	1	0	AUTH	T23	0	0
28	-140	880705	152156	0	111	111	1	4	WORD	T23	0	0
29	-144	880705	152156	0	37	37	1	0	AUTH	T23	0	0
30	-148	880705	152550	0	111	111	1	4	WORD	T23	0	0
31	-152	880705	152550	0	37	37	1	0	AUTH	T23	0	0
32	-156	880705	152848	0	111	111	1	4	WORD	T23	0	0
33	-172	880705	152848	0	37	37	1	0	AUTH	T23	0	0
34	-176	880812	105408	0	38	19	2	1	SPDT	T23	0	0
35	-180	880812	105408	0	46	23	2	4	CHAN	T23	0	0
36	-184	880812	105408	0	80	80	1	4	EVNT	T23	0	0
37	-188	880812	105408	0	57	19	3	1	FREQ	T23	0	0
38	-192	880812	105635	0	57	19	3	1	SPDT	T23	0	0
39	-196	880812	105635	0	69	23	3	4	CHAN	T23	0	0
40	-200	880812	105635	0	80	80	1	4	EVNT	T23	0	0
41	-204	880812	105636	0	57	19	3	1	FREQ	T23	0	0
42	-208	880812	111551	0	57	19	3	1	SPDT	T23	0	0
43	-212	880812	111551	0	69	23	3	4	CHAN	T23	0	0
44	-216	880812	111551	0	80	80	1	4	EVNT	T23	0	0
45	-220	880812	111551	0	57	19	3	1	FREQ	T23	0	0
46	-224	880812	112724	0	57	19	3	1	SPDT	T23	0	0
47	-228	880812	112724	0	69	23	3	4	CHAN	T23	0	0
48	-232	880812	112724	0	80	80	1	4	EVNT	T23	0	0
49	-236	880812	112724	0	57	19	3	1	FREQ	T23	0	0
50	-240	880812	113448	0	57	19	3	1	SPDT	T23	0	0
51	-244	880812	113448	0	69	23	3	4	CHAN	T23	0	0
52	-248	880812	113448	0	80	80	1	4	EVNT	T23	0	0
53	-252	880812	113448	0	57	19	3	1	FREQ	T23	0	0
54	-256	880812	125252	0	57	19	3	1	SPDT	T23	0	0
55	-260	880812	125252	0	69	23	3	4	CHAN	T23	0	0
56	-264	880812	125252	0	80	80	1	4	EVNT	T23	0	0
57	-268	880812	125252	0	57	19	3	1	FREQ	T23	0	0
58	-272	880812	125831	0	57	19	3	1	SPDT	T23	0	0
59	-276	880812	125831	0	69	23	3	4	CHAN	T23	0	0
60	-280	880812	125832	0	80	80	1	4	EVNT	T23	0	0
61	-284	880812	125832	0	57	19	3	1	FREQ	T23	0	0
62	-288	880812	130134	0	57	19	3	1	SPDT	T23	0	0
63	-292	880812	130134	0	69	23	3	4	CHAN	T23	0	0
64	-296	880812	130134	0	80	80	1	4	EVNT	T23	0	0
65	-312	880812	130134	0	57	19	3	1	FREQ	T23	0	0
66	-316	880812	131346	0	57	19	3	1	SPDT	T23	0	0
67	-320	880812	131347	0	69	23	3	4	CHAN	T23	0	0
68	-324	880812	131347	0	80	80	1	4	EVNT	T23	0	0
69	-328	880812	131347	0	57	19	3	1	FREQ	T23	0	0
70	332	880812	131503	0	57	19	3	1	SPDT	T23	0	0
71	336	880812	131503	0	69	23	3	4	CHAN	T23	0	0
72	340	880812	131503	0	80	80	1	4	EVNT	T23	0	0
73	344	880812	131503	0	57	19	3	1	FREQ	T23	0	0
74	348	880819	131701	0	111	111	1	4	WORD	T23	0	0
75	352	880819	131701	0	37	37	1	0	AUTH	T23	0	0

```
?run=event t23 all unit=1                                          Vapeps prompt, list event

Summary of event T23                                               Vapeps response
Description:

RPT 76A7575 T-23 MODIFIED ACOUSTIC ACCEPTANCE TEST BGM-109A/G 9/27/82.
QUALIFICATION TEST VEHICLE IN TLAM CONFIGURATION, W-80 SIMULATED WARHEAD
TEST LEVEL 157 DB OASPL.


Processing      GDC_TESTLAB    TOMAHAWK        TLAM           T23
Contracting     GDC            TOMAHAWK        TLAM           T23
Cognizant       JCMP           TOMAHAWK        TLAM           T23
Date            09/08/82
Time
Event           GROUND         REVERBERANT     ACCEPTANCE     157_DB_OASPL
Location        SAN_DIEGO      HARBOR_DRIVE    TEST_CHAMBER   T23
Vehicle         CRUISE_MSL     TOMAHAWK        TLAM           T23


Channels:

CHANNEL   TYPE    FLOW     FHIGH        X        Y        Z     SYST

 MAVG      -3     31.50    2000.00     0.00     0.00     0.00
 A45X       2     31.50    2000.00     0.00     0.00     0.00
 A24X       2     31.50    2000.00     0.00     0.00     0.00

Channel descriptions:

MAVG - AVERAGE OF 3 REVERBERANT CHAMBER MICROPHONES (MIC 1, MIC 2, MIC 3)
A45X - X AXIS STA 18.35 BULKHEAD/GUIDANCE ACCELEROMETER (A21450)
A24X - X AXIS STA 18.35 BULKHEAD ACCELEROMETER (A21240).

Configuration tree:

      LAST   THIS   MOUNT  ENCLOSURE GENERIC       SPECIFIC

 1    $      FUSE                    FUSELAGE      TLAM
 2    FUSE   NOSE                    NOSECONE      TLAM

Modules:

    MOD  CONF ZONE SYST   IX   IY   IZ   DESCRIPTIONS

 1  DPA4 NOSE FUSE        0    0    0     N12340        DFOONO       NOSE
 2  DPB4 FUSE FUSE        0    0    0     N12300        DF0000       FUSE
```

*** Module number 1 ***

	TYPE	CHAN	A	B	C	D	DESCRIPTIONS		
EXTA	0	1	0	0	0	0	HARBOR_DRIVE	TEST_CHAMBER	CELL
SKIN	0	0	0	0	0	0	FIBERGLASS	NOSECONE	CONE
INTA	0	0	0	0	0	0	T23	NOSE_CAVITY	NCAV
MONT	0	2	0	0	0	0	STA_18.35	BULKHEAD	BULK
INST	0	0	0	0	0	0			
FRAM	0	0	0	0	0	0			

Parameters:

	EXTA	SKIN	INTA	MONT	INST	FRAM
TYPE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RHO	1.12E-07	2.07E-04	1.12E-07	2.62E-04	********	********
XTYP	********	********	********	********	********	********
CD	1.32E+04	1.15E+05	1.32E+04	2.10E+05	********	********
V	1.00E+06	********	7.00E+02	1.80E+01	********	********
H	********	4.00E-01	********	2.00E-01	********	********
AP	2.00E+05	8.75E+02	2.60E+03	1.71E+02	********	********
BL	********	1.84E+01	********	********	********	********
AAC	2.00E-02	********	2.00E-02	6.40E+01	********	********
D$XI	********	1.84E+01	********	********	********	********
D$YO	********	6.40E+01	********	********	********	********
B	********	********	********	********	********	********
D	********	2.04E+01	********	********	********	********
CNT	********	********	********	********	********	********
DLF	********	5.00E-02	********	5.00E-02	********	********
E	********	2.50E+06	********	1.05E+07	********	********
G	********	********	********	********	********	********
T	********	********	********	********	********	********
PJ	********	********	********	********	********	********
A	********	********	********	********	********	********
RGF	********	********	********	********	********	********
PATA	********	6.40E+01	********	1.05E+02	********	********
ALPH	********	********	********	********	********	********
BETA	********	1.60E+01	********	********	********	********
RATE	********	********	********	********	********	********
RHOS	********	8.28E-05	********	********	********	********
VEL	********	********	********	1.80E+01	********	********
VISC	********	********	********	********	********	********
FBL	********	********	********	********	********	********
NSMS	********	0.00E+00	********	1.15E+00	********	********

Channels:

EXTA:
MAVG

MONT:
A24X A45X

*** Module number 2 ***

	TYPE	CHAN	A	B	C	D	DESCRIPTIONS		
EXTA	0	1	0	0	0	0	HARBOR_DRIVE	TEST_CHAMBER	CELL
SKIN	0	0	0	0	0	0	FORWARD	FUSELAGE	CYLIN
INTA	0	0	0	0	0	0	T23	FUSE_CAVITY	FCAV
MONT	0	0	0	0	0	0			
INST	0	0	0	0	0	0			
FRAM	0	0	0	0	0	0			

Parameters:

	EXTA	SKIN	INTA	MONT	INST	FRAM
TYPE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RHO	1.12E-07	2.62E-04	1.12E-07	********	********	********
XTYP	********	********	********	********	********	********
CO	1.32E+04	2.10E+05	1.32E+04	********	********	********
V	1.00E+06	********	8.46E+03	********	********	********
H	********	8.00E-02	********	********	********	********
AP	2.00E+05	2.18E+03	3.25E+03	********	********	********
BL	********	3.41E+01	********	********	********	********
AAC	2.00E-02	********	2.00E-02	********	********	********
D$XI	********	3.41E+01	********	********	********	********
D$YO	********	6.40E+01	********	********	********	********
B	********	********	********	********	********	********
D	********	2.04E+01	********	********	********	********
CNT	********	********	********	********	********	********
DLF	********	5.00E-02	********	********	********	********
E	********	1.05E+07	********	********	********	********
G	********	********	********	********	********	********
T	********	********	********	********	********	********
PJ	********	********	********	********	********	********
A	********	********	********	********	********	********
RGF	********	********	********	********	********	********
PATA	********	1.28E+02	********	********	********	********
ALPH	********	********	********	********	********	********
BETA	********	********	********	********	********	********
RATE	********	********	********	********	********	********
RHOS	********	2.09E-05	********	********	********	********
VEL	********	********	********	********	********	********
VISC	********	********	********	********	********	********
FBL	********	********	********	********	********	********
NSMS	********	5.08E-02	********	********	********	********

Channels

EXTA
MAVG
?end
CPU DELTA, EXECUTION, RUN = 52.20 52.20 55.18
CIAU

Vapeds prompt, exit vapeds

Example - 5
Run stream ADMINI5

```
fname 13,'DBT'
fname 15,'DICTIONARY.DAL'
run=padmin 1,GLL
dictionary/preadmin 1,GLL
list
done
admin
save 1,GLL
done
TOC 1
run=event GLL all unit=1
end
```

EXAMPLE - 5 (cont)

```
                            VAPEPS
      (VibroAcoustic Payload Environment Prediction System)
                         Version 5.4.1
                      System MASSCOMP/UNIX
                      (Released June 1988)

                          Developed by
               LOCKHEED MISSILES & SPACE COMPANY

                          Sponsored by
               NASA/GODDARD SPACE FLIGHT CENTER
                               &
                 US AIR FORCE/SPACE DIVISION

              User support and database management by
                   JET PROPULSION LABORATORY

        Date:  Friday, October 28, 1988        Time:   2:17:02 PM.
          Execution mode:  Batch        Core Size:  20000 words
 ?fname 13, 'DBT'
 ?fname 15, 'DICTIONARY.DAL'
 ?run=padmin 1,GLL
 ?dictionary/preadmin 1,GLL
Welcome to Data Dictionary version 1.0
Dictionary > list
Word $$$$ not found.
Dictionary > done
ACCEPTANCE     ACOUSTIC       ATLANTIS       CRUISE_MSL     DESPUN_SEC
DYNAMIC_LAB    GALILEO        GDC            GDC_TESTLAB    GROUND
HARBOR_DRIVE   JCMP           JPL            JPL_LAB        PASADENA
PROTOFLIGHT    REVERBERANT    SAN_DIEGO      SHUTTLE        SPACECRAFT
TEST           TEST_CHAMBER   TEST_LAB       TLAM           TOMAHAWK
Leaving Data Dictionary.
 ?admin
 ADMIN>save 1,GLL
 SAVE THE WORLD
THAT WAS EVENT NUMBER    2
 ADMIN>done
 ?TOC 1
```

TABLE OF CONTENTS FOR DAL UNIT 1 DAL001

SEG	RR	DATE	TIME	E	WORDS	NR	NC	T	ELN	VER	C1	C2
1	16	880916	84411	0	54	18	3	1	SPDT	GLL	0	0
2	20	880916	84411	0	69	23	3	4	CHAN	GLL	0	0
3	24	880916	84411	0	80	80	1	4	EVNT	GLL	0	0
4	28	880916	84411	0	54	18	3	1	FREQ	GLL	0	0
5	32	880916	84444	0	100	100	1	0	PREP	GLL	0	0
6	-36	880916	84445	0	93	31	3	1	DBDT	GLL	0	0
7	-40	880916	84445	0	54	18	3	4	CDSC	GLL	0	0
8	-44	880916	84445	0	24	3	8	1	PCHN	GLL	0	0
9	52	880916	84445	0	108	108	1	4	BOOK	GLL	0	0
10	56	880916	84445	0	72	72	1	4	RMRK	GLL	0	0
11	-60	880916	84446	0	93	31	3	1	DBDT	GLL	0	0
12	-64	880916	84446	0	54	18	3	4	CDSC	GLL	0	0
13	-68	880916	84446	0	24	3	8	1	PCHN	GLL	0	0
14	-76	880916	84447	0	4	1	4	4	CFDF	GLL	0	0
15	-80	880916	84447	0	6	3	2	4	CFGS	GLL	0	0
16	-84	880916	84447	0	3	3	1	0	CFBT	GLL	0	0
17	-88	880916	84449	0	64	64	1	0	DMDF	GLL	0	0
18	-92	880916	84449	0	180	180	1	1	DMPT	GLL	0	0
19	-100	880916	84449	0	27	27	1	4	DMDT	GLL	0	0
20	-104	880916	84449	0	15	3	5	4	DMCD	GLL	0	0
21	-112	880916	84919	0	66	66	1	4	WORD	GLL	0	0
22	-116	880916	84920	0	22	22	1	0	AUTH	GLL	0	0
23	120	881027	150654	0	93	31	3	1	DBDT	GLL	0	0
24	124	881027	150654	0	54	18	3	4	CDSC	GLL	0	0
25	128	881027	150654	0	24	3	8	1	PCHN	GLL	0	0
26	136	881027	150655	0	4	1	4	4	CFDF	GLL	0	0
27	140	881027	150655	0	6	3	2	4	CFGS	GLL	0	0
28	144	881027	150655	0	3	3	1	0	CFBT	GLL	0	0
29	148	881027	150659	0	128	64	2	0	DMDF	GLL	0	0
30	152	881027	150659	0	360	180	2	1	DMPT	GLL	0	0
31	164	881027	150659	0	57	57	1	4	DMDT	GLL	0	0
32	168	881027	150659	0	30	6	5	4	DMCD	GLL	0	0
33	188	881028	101101	0	57	19	3	1	SPDT	T23	0	0
34	192	881028	101102	0	69	23	3	4	CHAN	T23	0	0
35	196	881028	101102	0	80	80	1	4	EVNT	T23	0	0
36	200	881028	101102	0	57	19	3	1	FREQ	T23	0	0
37	204	881028	101127	0	100	100	1	0	PREP	T23	0	0
38	208	881028	101127	0	108	108	1	4	BOOK	T23	0	0
39	212	881028	101127	0	72	72	1	4	RMRK	T23	0	0
40	216	881028	101128	0	93	31	3	1	DBDT	T23	0	0
41	220	881028	101128	0	54	18	3	4	CDSC	T23	0	0
42	224	881028	101128	0	24	3	8	1	PCHN	T23	0	0
43	232	881028	101129	0	8	2	4	4	CFDF	T23	0	0
44	236	881028	101129	0	12	6	2	4	CFGS	T23	0	0
45	240	881028	101129	0	6	6	1	0	CFBT	T23	0	0
46	244	881028	101133	0	128	64	2	0	DMDF	T23	0	0
47	248	881028	101133	0	360	180	2	1	DMPT	T23	0	0
48	260	881028	101133	0	69	69	1	4	DMDT	T23	0	0
49	264	881028	101133	0	20	4	5	4	DMCD	T23	0	0
50	-272	881028	101256	0	111	111	1	4	WORD	T23	0	0
51	-276	881028	101256	0	37	37	1	0	AUTH	T23	0	0
52	-280	881028	102443	0	111	111	1	4	WORD	T23	0	0

?run=event GLL all unit = 1

Summary of event GLL
Description:

REPORT JPL D-1936, FEBRUARY, 1985 GALILEO (GLL) PROTOFLIGHT
SPACECRAFT ACOUSTIC TEST REPORT
FINAL SYSTEM LEVEL TEST, COMPLETE SPACECRAFT
142 DB OASPL

Processing	JPL	GALILEO	PROTOFLIGHT	GLL
Contracting	JPL	GALILEO	DESPUN_SEC	GLL
Cognizant	JPL	GALILEO	DESPUN_SEC	GLL
Date	09/24/84			
Time				
Event	GROUND	REVERBERANT	PROTOFLIGHT	SYSTEM_LEVEL
Location	PASADENA	JPL	ACOUSTIC	CHAMBER
Vehicle	SHUTTLE	ATLANTIS	GALILEO	STS-34

Channels:

CHANNEL	TYPE	FLOW	FHIGH	X	Y	Z	SYST
A1	1	40.00	2000.00	0.00	0.00	0.00	
A2	1	40.00	2000.00	0.00	0.00	0.00	
A3	1	40.00	2000.00	0.00	0.00	0.00	

Channel descriptions:

A1 - X AXIS ACCELEROMETER
A2 - Y AXIS ACCELEROMETER
A3 - Z AXIS ACCELEROMETER

Configuration tree:

	LAST	THIS	MOUNT	ENCLOSURE	GENERIC	SPECIFIC
1	$	DESP			DESPUN	GLL_DESP_SEC

Modules:

	MOD	CONF	ZONE	SYST	IX	IY	IZ	DESCRIPTIONS		
1	DPA1	DESP	IUS		0	0	0	DESP	IUS	GLL
2	DPA4	DESP	DESP		0	0	0	N12300	DFN000	GLL_DESP_SEC

*** Module number 1 ***

	TYPE	CHAN	A	B	C	D	DESCRIPTIONS		
EXTA	0	0	0	0	0	0	JPL	TEST_CHAMBER	CELL
SKIN	0	3	0	0	0	0	DESPUN	UPAD	IUS
INTA	0	0	0	0	0	0	GLL	CAVITY	DESP
MONT	0	0	0	0	0	0			
INST	0	0	0	0	0	0			
FRAM	0	0	0	0	0	0			

Parameters

	EXTA	SKIN	INTA	MONT	INST	FRAM
TYPE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RHO	1.15E-07	1.25E-04	1.15E-07	********	********	********
XTYP	********	********	********	********	********	********
CO	1.38E+04	1.98E+05	1.38E+04	********	********	********
V	1.77E+07	********	4.02E+05	********	********	********
H	********	1.48E-01	********	********	********	********
AP	4.13E+05	1.87E+03	2.28E+04	********	********	********
BL	********	1.20E+01	********	********	********	********
AAC	1.50E-02	********	1.50E-02	********	********	********
D$XI	********	1.60E+02	********	********	********	********
D$YO	********	1.20E+01	********	********	********	********
B	********	********	********	********	********	********
D	********	5.50E+01	********	********	********	********
CNT	********	********	********	********	********	********
DLF	********	5.00E-02	********	********	********	********
E	********	4.89E+06	********	********	********	********
G	********	********	********	********	********	********
T	********	********	********	********	********	********
PJ	********	********	********	********	********	********
A	********	********	********	********	********	********
RGF	********	********	********	********	********	********
PATA	********	3.20E+02	********	********	********	********
ALPH	********	********	********	********	********	********
BETA	********	********	********	********	********	********
RATE	********	********	********	********	********	********
RHOS	********	1.17E-05	********	********	********	********
VEL	********	********	********	********	********	********
VISC	********	********	********	********	********	********
FBL	********	********	********	********	********	********
NSMS	********	9.19E-01	********	********	********	********

Channels

SKIN
A1 A2 A3

*** Module number 2 ***

	TYPE	CHAN	A	B	C	D	DESCRIPTIONS		
EXTA	0	0	0	0	0	0	JPL_ACO_CHM	NITROGEN	REVERBERANT
SKIN	0	3	0	0	0	0	GLL_DSP_CONE	MAGNESIUM	STIFFENERS
INTA	0	0	0	0	0	0	DSP_CONE_INT	NITROGEN	REVERBERANT
MONT	0	0	0	0	0	0			
INST	0	0	0	0	0	0			
FRAM	0	0	0	0	0	0			

Parameters:

	EXTA	SKIN	INTA	MONT	INST	FRAM
TYPE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RHO	1.15E-07	1.25E-04	1.15E-07	********	********	********
XTYP	********	********	********	********	********	********
CO	1.38E+04	1.98E+05	1.38E+04	********	********	********
V	1.77E+07	********	4.02E+05	********	********	********
H	********	1.48E-01	********	********	********	********
AP	4.13E+05	1.87E+03	2.28E+04	********	********	********
BL	********	1.20E+01	********	********	********	********
AAC	1.50E-02	********	1.50E-02	********	********	********
D$XI	********	1.60E+02	********	********	********	********
D$YO	********	1.20E+01	********	********	********	********
B	********	********	********	********	********	********
D	********	5.50E+01	********	********	********	********
CNT	********	********	********	********	********	********
DLF	********	5.00E-02	********	********	********	********
E	********	4.89E+06	********	********	********	********
G	********	********	********	********	********	********
T	********	********	********	********	********	********
PJ	********	********	********	********	********	********
A	********	********	********	********	********	********
RGF	********	********	********	********	********	********
PATA	********	3.20E+02	********	********	********	********
ALPH	********	********	********	********	********	********
BETA	********	********	********	********	********	********
RATE	********	********	********	********	********	********
RHOS	********	1.17E-05	********	********	********	********
VEL	********	********	********	********	********	********
VISC	********	********	********	********	********	********
FBL	********	********	********	********	********	********
NSMS	********	9.19E-01	********	********	********	********

Channels

SKIN
A1 A2 A3
?end
CPU DELTA, EXECUTION, RUN = 63.62 63.62 64.45
CIAU

5. CONCLUSIONS

A procedural method for creating a VAPEPS Database has been presented. Flowcharts of sequential commands were developed for reference and their use demonstrated by examples.

6. REFERENCES

1. Lee, Y. A, et al., "Vibroacoustic Payload Environment Prediction System (VAPEPS)," NASA Contractor Report No. 166823, Lockheed Missiles and Space Company, June 1984.

2. Park, D. M., " Vibroacoustic Payload Environment Prediction System (VAPEPS), VAPEPS User's Reference Manual," NASA Contractor Report No. 180781, Lockheed Missiles and Space Company, July 1988.

3. Filan, A. E., "VAPEPS Data Base Documentation," Report No. D-88-033-CM, General Dynamics/Convair Division, June 1988.

APPENDIX A

CREATING A VAPEPS MODEL OF GALILEO

APPENDIX A

CREATING A VAPEPS MODEL OF GALILEO

The VAPEPS Database SEA models consist of up to five elements: EXTA (external acoustic space), INTA (internal acoustic space), SKIN (structure), MONT (mount structure), and INST (internal structure). A model must conform to two or more of these elements in order to be entered into the Database. This limitation, however, does not apply when making predictions using the SEMOD Processor.

As shown in the following excerpt from the Summer 1988 VAPEPS NewsLetter, the Galileo Spacecraft lower sections were modeled in SEMOD by using six distinct elements: despun section, upper, lower, and IUD adapters, and external and internal acoustic spaces. The Database model, on the other hand, was developed using three elements: EXTA (external acoustic space), SKIN (pseudo despun section), and INTA (internal acoustic space). The MONT and INST elements were not used in this model. The despun section was chosen as the Database model because it contained the only accelerometer from which data was obtained during the acoustic tests of the lower spacecraft section.

Creating a VAPEPS Model of Galileo: the Lower Sections

Melissa Slay; JPL

JPL's Galileo spacecraft is scheduled to fly a mission to Jupiter to observe the planet and its Galilean satellites, measure its intense magnetic environment, and directly sample the planet's atmosphere. The spacecraft will be carried into Earth orbit by the space shuttle Discovery in October/November 1989, and then boosted into its interplanetary trajectory by a two-stage Inertial Upper Stage (IUS). This trajectory will provide gravity assists from one Venus flyby (February 1990) and two Earth flybys (December 1990 and December 1992) during the spacecraft's six year journey to Jupiter.

This was not Galileo's originally planned flight. The spacecraft was to be launched aboard a space shuttle in May 1986, and then boosted into a direct trajectory to Jupiter by a Centaur rocket. This was changed to the present mission after the Challenger accident and the cancellation of the Centaur/shuttle program. At the time, Galileo had already undergone all of its assembly level and system level testing, and was at Kennedy Space Center awaiting launch. The new mission design required the addition of new hardware as well as rework of existing hardware to withstand harsher thermal environments and to function over a longer period of time. Galileo was brought back to JPL and disassembled so that it could be rebuilt to withstand its new mission requirements.

The response of the lower sections of Galileo to the expected acoustic load is of interest since they are thin structures with large surface areas. Several instrument assemblies are attached to these sections through trusses, as seen in Figure 1. The VAPEPS model consists of the despun section, upper adapter, lower adapter, and IUS adapter. The IUS adapter is new hardware required for the mission change. The super-zip (cylindrical ring between the despun section and upper adapter) was not modeled, since its configuration and size make it difficult for an accurate SEA element to be developed. The despun section, upper adapter, and lower adapter were modeled as conical sections with identical apex angles. The IUS adapter was modeled as a cylinder.

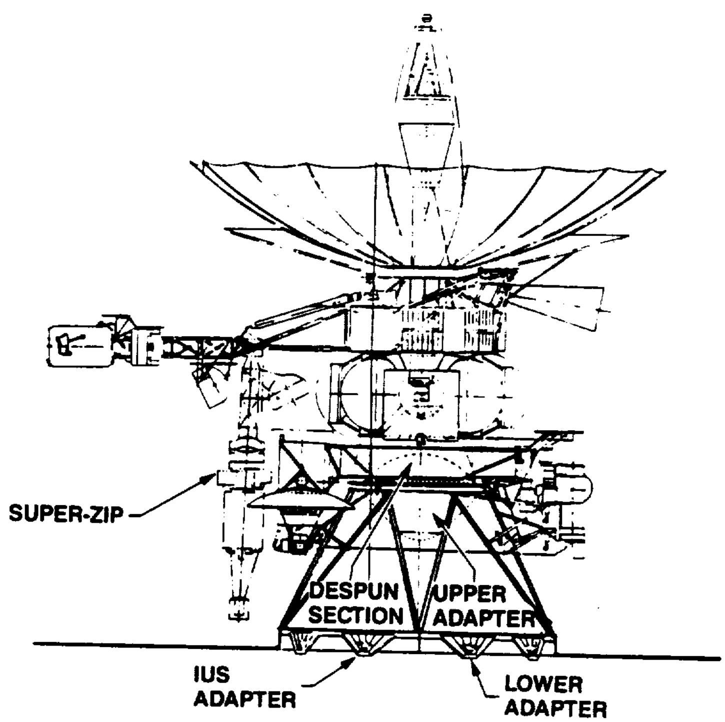


Figure 1. Galileo Spacecraft

Creating Your Own RUN = Commands

Loading and Executing a Runstream

Once a runstream has been created using the system editor, it must be loaded into VAPEPS so that it can be executed. On a VAX or a UNIX machine the editor file may be loaded using the CSYM command. For our example the file name should be RUNCPMD.DRS. Now load it into DAL unit 27 (DAL unit 30 may be used if the runstream is to be available system wide). The command to load it is as follows:

```
CSYM DRS RUN CPMD 27
```

On all systems a FORTRAN file may be loaded with the SYMIN command. Let us assume that the file is contained in FORTRAN unit 1. On a VAX the file name would be FOR001.DAT. Consult your system FORTRAN documentation for naming conventions on other systems. The command would be as follows:

```
SYMIN 27 RUN CPMD 1
```

To execute it use the following command:

```
RUN27 = CPMD ...
```

Example Runstream

Now putting it all together we have the following runstream.

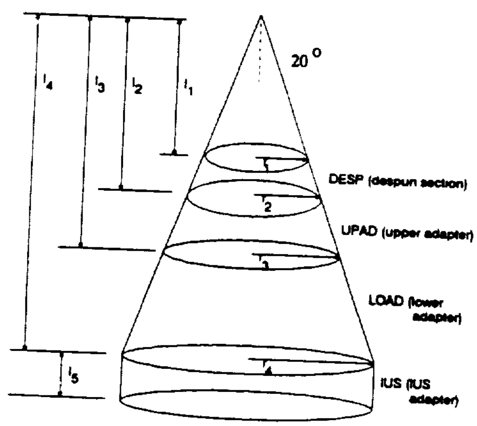
```
*RUN = CPMD Command
*
*Purpose
*
*Calculates the frequencies of
*modes on a simply supported
*curved plate.
*
*Command
*
* RUN = CPMD E,H,RHOS,R,AL,
*        THETA,M,N,GAMMA
*
*  Where
*
* E-Young's modulus.
* H-Thickness of plate.
* RHOS- Surface mass density of plate.
* AL-Length of plate.
* THETA-Angle subtended by plate.
* M-Longitudinal mode number.
* N-Circumferential mode number.
* GAMMA-Poisson's ratio.

  RECOVERE E, H, RHOS, R, AL, THETA, M, N, GAMMA
  DEFAULT E = 10.E + 6, H = 0.1, RHOS = 2.54E-5,
  DEFAULT  GAMMA = .3,  AL = 20.,  M = 1,  N = 1,
THETA = 90.

  * First check input.

  CALC
    NAME = 'E'
    ##JLEZ &E, ERX1
    NAME = 'H'
    ##JLEZ &H, ERX1
    NAME = 'RHOS'
    ##JLEZ &RHOS, ERX1
    NAME = 'R'
    ##JLEZ &R, ERX1
    NAME = 'AL'
    ##JLEZ &AL, ERX1
    NAME = 'THETA'
    ##JLEZ &THETA, ERX1
    NAME = 'GAMMA'
    ##JLEZ &GAMMA, ERX1
    NAME = 'M'
    ##JLTZ &M, ERX2
    NAME = 'N'
    ##JLTZ &N, ERX2
  DONE

  * Everything is ok so calculate mode.

CALC
 GAM1 = GAMMA**2
 GAM1 = 1-GAM1
 T1 = H**3*E/12./RHOS/GAM1
 AMPL = M * PI$ / L ** 2
 ANRT = N * PI$ / R / THETA ** 2
 T2 = AMPL + ANRT ** 2
 T3 = E * H / R / R / RHOS
 T4 = AMPL * AMPL / T2
 WMN1 = T1*T2
 WMN2 = T3*T4
 WMN = WMN1 + WMN2 ** .5
DONE
* Display output.
write 6 &M, &N, &WMN
(' Frequency of mode ',I2,',',I2,' = ',F8.2)
SET IERR = 0
##JUMP EXIT
*  Error exits.
 >ERX1
 DONE
 WRITE 6 &NAME
 (' Variable ',A4,' is less than or equal to
 zero.')
 SET IERR = 1
 ##JUMP EXIT
 >ERX2
 DONE
 WRITE 6 &NAME
 (' Mode number ',A1,' is less than zero.')
 SET IERR = 1
 ##JUMP EXIT
 >EXIT
 RUN- CPMD &IERR
```

ORIGINAL PAGE IS
OF POOR QUALITY

**Creating a VAPEPS Model of Galileo:
the Lower Sections**

Step 1. Obtain Structural Parameters

Overall Geometry



r_1 = 23.5 in
r_2 = 27.5 in
r_3 = 39 in
r_4 = 54 in

l_1 = 65 in
l_2 = 77 in
l_3 = 102 in
l_4 = 134 in
l_5 = 10 in

Using RUN = EOPL

Despun Section (DESP):

```
* The despun section is a magnesium cone with 25 aluminum stiffeners, two magnesium
* doublers, and eight aluminum longerons. To use RUN = EQPL, the cone is assumed to
* be  a flat plate whose width is equal to the  height of the cone and whose length is equal
* to  the circumference at the middle of the cone. The distance to each layer's centroid is

* referenced  from the bottom of the bare skin layer.
*
* Bare skin layer 1: magnesium cone
* Widthwise beam layer 1: stiffeners (25 @ 2.125 in. wide)
* Widthwise beam layer 2: doublers (2 @ 3.15 in. wide)
* Widthwise beam layer 3: longerons (8 @ 3.15 in. wide)
*
?run = eqpl 1,desp
General parameters > ns = 1,nbl = 0,nbw = 3,rlen = 160.,wid = 12.
General parameters > er = 6.5e6,rhor = 1.65e-4,cl = 1.98e5
General parameters > done
OK
Bare skin layer  1 of  1 > h = .071,cen = .0355
Bare skin layer  1 of  1 > done
OK
Widthwise beam layer  1 of  3 > h = .025,cen = .0835,e = 1.06e7, rho = 2.591e-4,w = 53.13
Widthwise beam layer  1 of  3 > done
OK
Widthwise beam layer  2 of  3 > h = .071,cen = .1065,w = 6.3
Widthwise beam layer  2 of  3 > done
OK
Widthwise beam layer  3 of  3 > h = .1,cen = .121,e = 1.06e7,rho = 2.591e-4,w = 25.2
Widthwise beam layer  3 of  3 > done
OK
* Result:  1,EQPL,DESP   Size: (9 x 1)
* Result:  1,SEQP,DESP   Size: (6 x 1)
                 Input Specifications
      RLEN =  1.600E+02, WID =  1.200E+01, CL =  1.980E+05
  Layer     H        CEN         E           RHO        W
                    bare skin
     1   7.100E-02  3.550E-02  6.500E+06  1.650E-04   N/A
                  widthwise beams
     1   2.500E-02  8.350E-02  1.060E+07  2.591E-04  5.313E+01
     2   7.100E-02  1.065E-01  6.500E+06  1.650E-04  6.300E+00
     3   1.000E-01  1.210E-01  1.060E+07  2.591E-04  2.520E+01
                 Equivalent Parameters
 H =  1.477E-01, E =  4.890E+06, RHO =  1.246E-04, RHOS =  1.172E-05
               Stress prediction parameters
 H =  1.344E-01, E =  6.500E+06, RHO =  8.718E-05, RHOS =  1.172E-05
               Centroid distance =  6.244E-02
```

Upper Adapter (UPAD):

```
* The upper adapter is a cone made up of graphite epoxy face sheets and an
* aluminum honeycomb core. To use RUN = EQPL, the cone is assumed to be a flat
* plate whose width is equal to the height of the cone and whose length is
* equal to the circumference at the middle of the cone. The distance to
* each layer's centroid is referenced from the center of the honeycomb core.
*
* Bare skin layer 1: graphite epoxy face sheet
* Bare skin layer 2: aluminum honeycomb core
* Bare skin layer 3: graphite epoxy face sheet
```

Creating a VAPEPS Model of Galileo: the Lower Sections

```
?run = eqpl 1,upad
General parameters >  ns = 3,nbl = 0,nbw = 0,rlen = 207.,wid = 25.
General parameters >  er = 14.3e6,rhor = 1.63e-4,cl = 7.68e4
General parameters >  done
OK
Bare skin layer  1 of  3 >  h = .021,cen = .1355
Bare skin layer  1 of  3 >  done
OK
Bare skin layer  2 of  3 >  h = .25,cen = .0,e = .0,rho = 4.64e-6
Bare skin layer  2 of  3 >  done
OK
Bare skin layer  3 of  3 >  h = .021,cen = -.1355
Bare skin layer  3 of  3 >  done
OK
• Result:  1,EQPL,UPAD   Size: (9 x 1)
• Result:  1,SEQP,UPAD   Size: (6 x 1)

                 Input Specifications
      RLEN =  2.070E+02, WID =  2.500E+01, CL =  7.680E+04
  Layer   H          CEN         E          RHO       W
                      bare skin
    1   2.100E-02  1.355E-01  1.430E+07  1.630E-04   N/A
    2   2.500E-01  0.000E+00  0.000E+00  4.640E-06   N/A
    3   2.100E-02 -1.355E-01  1.430E+07  1.630E-04   N/A

                 Equivalent Parameters
  H =  1.675E+00, E =  2.823E+04, RHO =  4.781E-06, RHOS =  8.006E-06
              Stress prediction parameters
  H =  2.101E-01, E =  1.430E+07, RHO =  3.811E-05, RHOS =  8.006E-06
              Centroid distance  =  0.000E+00
```

Lower Adapter (LOAD):

RUN = EQPL was not used for the lower adapter since it is a homogeneous aluminum structure with no beam layers.

Inertial Upper Stage (IUS):

```
• The IUS adapter is a magnesium cylinder with one lenghwise aluminum ring
• and eight widthwise aluminum flanges. To use RUN = EOPL, the cylinder
• is assumed to be a flat plate whose width is equal to the height of the
• cylinder and whose length is equal to its circumference. The distance to
• each layer's centroid is referenced from the bottom of the bare skin layer.
•
• Bare skin layer 1: magnesium cylinder
• Lengthwise beam layer 1: aluminum ring (2 in. wide)
• Widthwise beam layer 1: aluminum flanges (8 @ 20 in. wide)
•
?run = eqpl 1,ius
General parameters  > ns = 1,nbl = 1,nbw = 1,rlen = 339.,wid = 10.
General parameters >  er = 10.6e6,rhor = 2.591e-4,cl = 1.98e5
General parameters >  done
OK
Bare skin layer  1 of  1  > h = .1,cen = .05,e = 6.5e6,rho = 1.653e-4
Bare skin layer  1 of  1 >  done
OK
Lengthwise beam layer  1 of  1 >  h = .3,cen = .25,w = 2.
Lengthwise beam layer  1 of  1  > done
OK
Widthwise beam layer  1 of  1 >  h = .3,cen = .25,w = 160.
Widthwise beam layer  1 of  1 >  done
OK
• Result:  1,EOPL,IUS   Size: (9 x 1)
• Result:  1,SEOP,IUS   Size: (6 x 1)

                 Input Specifications
      RLEN =  3.390E+02, WID =  1.000E+01, CL =  1.980E+05
  Layer   H         CEN          E          RHO        W
                      bare skin
    1   1.000E-01  5.000E-02  6.500E+06  1.653E-04   N/A
                   lengthwise beams
    1   3.000E-01  2.500E-01  1.080E+07  2.591E-04  2.000E+00
                   widthwise beams
    1   3.000E-01  2.500E-01  1.080E+07  2.591E-04  1.600E+02
                 Equivalent Parameters
  H =  3.645E-01, E =  7.404E+06, RHO =  1.886E-04, RHOS =  1.653E-05
              Stress prediction parameters
  H =  3.234E-01, E =  1.080E+07, RHO =  5.111E-05, RHOS =  1.653E-05
              Centroid distance  =  1.896E-01
```

Surface Areas

The surface area of a cone is:

$$AP = pi \cdot r \cdot (r^2 + l^2)^{1/2}$$
$$AP_{DESP} = 1962 \text{ in}^2$$
$$AP_{UPAD} = 6318 \text{ in}^2$$
$$AP_{LOAD} = 11{,}129 \text{ in}^2$$

The surface area of a cylinder is:

$$AP = 2 \cdot pi \cdot r \cdot l$$
$$AP_{IUS} = 3393 \text{ in}^2$$

The sum of all surface areas yields the surface area of the internal acoustic space, INTA.

Creating a VAPEPS Model of Galileo: the Lower Sections

INTA's VOLUME and AP were obtained earlier while determining structural parameters. The acoustic absorption coefficient, AAC, is estimated based on past experience. Again, EXTA's AAC is not used since EXTA is the excitation element. INTA's AAC is based on recommendations from LMSC for acoustic spaces surrounded by "smooth" surfaces. For surfaces with thermal blankets, equipment, or cabling, AAC should be increased.

Step 3. Determine Connection Paths

The acoustic spaces are connected to the structural elements using both resonant and nonresonant connection paths. The structural elements are connected to each other by using type 43, which is actually a butt connection between two plates. VAPEPS will accept cones or cylinders instead of plates, but will treat them as plates. Obviously, this is not an entirely accurate representation of a conical section, but is the best method available, and in this case works reasonably well. BJL, the butt joint length, is the circumference at the interface of the elements.

Step 4. Obtain the Excitation Levels

The levels in this model are the levels measured in the Galileo protoflight acoustic test.

Step 5. Execute VAPEPS

```
* This model consists of the despun section, upper adapter, lower adapter,
* and IUS adapter from the Galileo spacecraft.
*

?##on echo
?semod 1,gll
Creating new model GLL
SEMOD > elname
Maximum number of elements  =   50
Maximum variable storage    =  900
Maximum string storage words =  1000
Input element name >  exta,1
EXTA >  rho = 1.148e-7,co = 1.378e4,volume = 1.773e7,ap = 4.130e5,aac = 1.5e-2
EXTA  >done
OK
Input element name >  inta,1
INTA  > rho = 1.148e-7,co = 1.378e4,volume = 402132.,ap = 22802.,aac = 1.5e-2
INTA  >done
OK
Input element name >  desp,5
DESP  > rho = 1.248e-4,cl = 1.98e5,h = 1.477e-1,ap = 1874.,bl = 12.,alx = 160.,aly = 12.
DESP >  d = 55.,dif = .05,e = 4.890e6,pala = 320.,rhos = 1.172e-5,asms = .919
DESP >  co = 1.378e4,pivotfrq = 250.,beta = 20.
DESP >  done
OK
Input element name >  upad,5
UPAD  > rho = 4.781e-6,cl = 7.68e4,h = 1.675,ap = 7028.,bl = 25.,alx = 207.,aly = 25.
UPAD  >d = 78.,dif = .05,e = 2.823e4,pala = 418.,rhos = 8.008e-6,asms = .7856
UPAD >co = 1.378e4,pivotfrq = 250.,beta = 20.
UPAD >done
OK
Input element name >  load,5
LOAD  >rho = 2.591e-4,cl = 2.01e5,h = 8.e-2,ap = 12815.,bl = 32.,alx = 292.,aly = 32.
LOAD >  d = 108.,dif = .05,e = 10.6e6,pala = 584.,rhos = 2.591e-4,asms = .4791
LOAD  > co = 1.378e4,pivotfrq = 250.,beta = 20.
LOAD  > done
OK
Input element name >  ius,4
IUS   >rho = 5.111e-5,cl = 1.98e5,h = .323,ap = 3393.,bl = 10.,alx = 339.,aly = 10.
IUS  > d = 108.,dif = .05,e = 7.404e6,pala = 509.,rhos = 1.653e-5,asms = 0.
IUS   >co = 1.378e4,pivotfrq = 250.
IUS  > done
OK
Input element name >  done
OK
SEMOD  >pathname
Approximate maximum number of connections =   60
Approximate maximum variable storage      =  300
Input connection >  exta,desp,inta,6
Creating new path.
EXTA,DESP,INTA >  done
OK
Input connection >  exta,upad,inta,6
Creating new path.
EXTA,UPAD,INTA >  done
OK
Input connection >  exta,load,inta,6
Creating new path.
EXTA,LOAD,INTA  > done
OK
Input connection >  exta,ius,inta,5
Creating new path.
EXTA,IUS,INTA >  done
OK
Input connection >  exta,desp,3
```

Creating a VAPEPS Model of Galileo: the Lower Sections

Volumes

The volume of a cone is:

$V = (1/3) * pi * r^2 * l$
$V_{DESP} = 23{,}389 \text{ in}^3$
$V_{UPAD} = 101{,}485 \text{ in}^3$
$V_{LOAD} = 246{,}722 \text{ in}^3$

The volume of a cylinder is:

$V = pi * r^2 * l$
$V_{IUS} = 30{,}536 \text{ in}^3$

The volume of the internal acoustic space, INTA, is the sum of all volumes.

PATA

PATA, the total length of discontinuities, is used in VAPEPS to account for the edge effects (from stiffeners, beams, etc.) on the radiation efficiency below the critical frequency. However, if the structure itself is not any larger than the bending wavelength at its critical frequency, then the edges do not affect the radiation efficiency and therefore should not be included in PATA. The bending wavelength is defined as the bending wave speed, C_b, divided by the frequency, f, where

$C_b = [2 \, pi \, f \, K \, C_l]^{1/2}$
K = radius of gyration
C_l = longitudinal wave speed

$PATA_{DESP}$ = the upper circumference + the lower circumference = 320 in
$PATA_{UPAD}$ = the upper circumference + the lower circumference = 418 in
$PATA_{LOAD}$ = the upper circumference + the lower circumference = 584 in
$PATA_{IUS}$ = the upper circumference + one half the lower circumference = 509 in

ALX and ALY

ALX and ALY, the subpanel dimensions, are also used to account for edge effects (from stiffeners, beams, etc.) at and below the critical frequency. Dividing this model into subpanels had little effect on the results so subpanels were not used. Further investigation is being done to better define the use of ALX and ALY.

DESP:
ALX = circumference at the middle of the cone = 160 in
ALY = height of cone = 12 in

UPAD:
ALX = circumference at the middle of the cone = 207 in
ALY = height of cone = 25 in

LOAD:
ALX = circumference at the middle of the cone = 292 in
ALY = height of cone = 32 in

IUS:
ALX = circumference of cylinder = 339 in
ALY = height of cylinder = 10 in

ASMS

ASMS, the added nonstructural mass, was taken from a Galileo weight list.

$ASMS_{DESP}$ = 355 lb = 0.919 lb s^2/in
$ASMS_{UPAD}$ = 303 lb = 0.7856 lb s^2/in
$ASMS_{LOAD}$ = 185 lb = 0.4791 lb s^2/in
$ASMS_{IUS}$ = 0 lb = 0 lb s^2/in

DLF and PIVOTFRQ

DLF, the damping loss factor, and PIVOTFRQ, the frequency to pivot damping as a function of 1/frequency, are estimates based on past experience.

DLF = 0.05
PIVOTFRQ = 250 Hz

It is recommended that a value of 0.04 or 0.05 be used as the DLF for aluminum or magnesium. For structures made of composites (such as graphite/epoxy), it is recommended that a value between 0.05 and 0.1 be used.

Step 2. Obtain Acoustical Parameters

The mass density and speed of sound for EXTA and INTA are the values for nitrogen, which is what JPL uses in its acoustic chamber. The volume of the chamber and the total surface area of its walls are used for EXTA's VOLUME and AP, respectively, although they are not used by VAPEPS since EXTA is the excitation element.

Creating a VAPEPS Model of Galileo: the Lower Sections

```
Creating new path.
EXTA,DESP >  done
OK
Input connection >  exta,upad,3
Creating new path.
EXTA,UPAD >  done
OK
Input connection >  exta,load,3
Creating new path.
EXTA,LOAD  > done
OK
Input connection >  ext,ius,2
Creating new path.
EXTA,IUS  >done
OK
Input connection >  inta,desp,3
Creating new path.
INTA,DESP  > done
OK
Input connection >  inta,upad,3
Creating new path.
INTA,UPAD  done
OK
Input connection >  inta,load,3


Creating new path.
INTA,LOAD  > done
OK
Input connection >  inta,ius,2
Creating new path.
INTA,IUS  > done
OK
Input connection >  desp,upad,43
Creating new path.
UPAD,DESP  > bjl = 160.
UPAD,DESP  > done
OK
Input connection >  upad,load,43
Creating new path.
LOAD,UPAD  > bjl = 207.
LOAD,UPAD >  done
OK
Input connection >  load,ius,43
Creating new path.
IUS,LOAD  > bjl = 339.
IUS,LOAD  > done
OK
Input connection >  done
OK
SEMOD > setexc exta
SEMOD > frequency 40.0,2000.0
 FREQ 1:  FREQ  GLL   0   0, SIZE =   18    1, NJ =   1
SEMOD > excitation
EXTA >  (18)  117.5,127.,129.5,132.5,132.5,131.,133.5,134.,130.,131.,130.
EXTA >   ( 7)  128.,127.5,127.,126.5,122.5,120.,118.
SEMOD  > mdens
 DENS 1:  DENS  GLL   0   0, SIZE =   18    6, NJ =   1
SEMOD > atacalc
# of damping loss factors  =  6
# of coupling loss factors  =  30
 ATA  1:  ATA   GLL   0   0, SIZE =   18   36, NJ =   1
SEMOD >  ataco
 CO   1:  CO    GLL   0   0, SIZE =   36   18, NJ =   1
 TRNF 1:  TRNF  GLL   0   0, SIZE =   18    5, NJ =   1
SEMOD >  cfac 7,1,4
 CONV 1:  CONV  GLL   0   0, SIZE =   18    6, NJ =   1
SEMOD > tprd
 RESP 1:  RESP  GLL   0   0, SIZE =   18    6, NJ =   1
SEMOD >  power
 POWR 1:  POWR  GLL   0   0, SIZE =   18   36, NJ =   1

SEMOD >  list resp
Excitations and responses for model GLL
Frequency EXTA    INTA    DESP       UPAD       LOAD       IUS
Hertz      dB      dB     G**2/Hz    G**2/Hz    G**2/Hz    G**2/Hz
   40.0 117.5    103.1   3.0010E-04 8.8828E-04 1.7305E-03 3.9001E-03
   50.0 127.0    114.1   3.3562E-03 9.3288E-03 1.9498E-02 4.1839E-02
                                   .
                                   .
                                   .
 2000.0 118.0    112.6   9.6437E-04 1.0565E-03 7.8641E-03 1.8443E-02
```

Creating a VAPEPS Model of Galileo: the Lower Sections

```
SEMOD >  list ring
Ring frequencies for model GLL
Frequency
Hertz    DESP        UPAD        LOAD        IUS
  40.0   1.1897E+03  3.3340E+02  6.2397E+02  5.6357E+02

SEMOD >  list crit
Critical frequencies for model GLL
Frequency  EXTA        EXTA        EXTA        EXTA        INTA
Hertz      DESP        UPAD        LOAD        IUS         DESP
40.0       3.5894E+03  8.1147E+02  6.4917E+03  1.6322E+03  3.5894E+03
Frequency  INTA        INTA        INTA
Hertz      UPAD        LOAD        IUS

SEMOD > list dens
Modal densities for model GLL
Frequency  EXTA        INTA        DESP        UPAD        LOAD        IUS
Hertz
40.0    1.3683E-01  3.1034E-03  2.0442E-02  2.4677E-02  2.5831E-01  2.2105E-02
50.0    2.1380E-01  4.8491E-03  2.2856E-02  2.7590E-02  2.8880E-01  2.4714E-02
                                .
                                .
                                .
2000.0  3.4206E+02  7.7566E+00  1.2821E-01  7.4157E-02  1.0717E+00  8.8484E-02
```

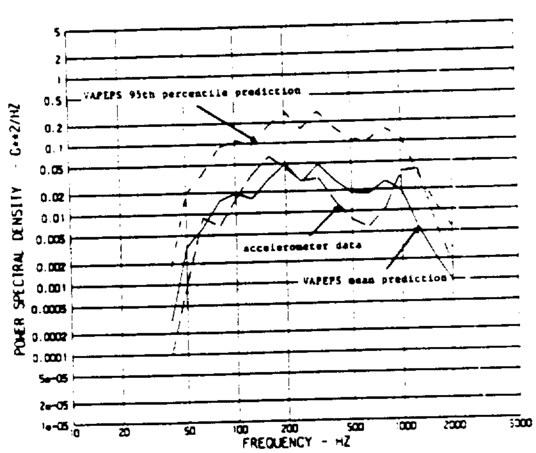


Figure 2. VAPEPS Prediction for the Galieo despun section

Note: The VAPEPS outfile was edited due to its length.

Step 6. Examine Results

The response of the despun section is shown plotted against data from an accelerometer located on the super-zip, at the despun section interface. Unfortunately, there were no other measurements made on the lower sections of the spacecraft during the acoustic test, so it cannot be determined absolutely if the model is valid. The VAPEPS prediction does closely follow the data, and the 95th percentile does envelope that local response which is what we would expect of our model. (See Figure 2.)

To estimate the frequency range over which the prediction is valid, the number of modes per one-third octave band (calculated from the modal densities listed in the output) was plotted (Figure 3). There are approximately two modes in the one-third octave band centered at 200 Hz. Predictions at frequencies below this do not contain enough modes to be considered valid. Between 200 Hz and 400 Hz, where there are between two and six modes per one-third octave band, the prediction is considered questionable. Above 400 Hz, the prediction is considered valid..

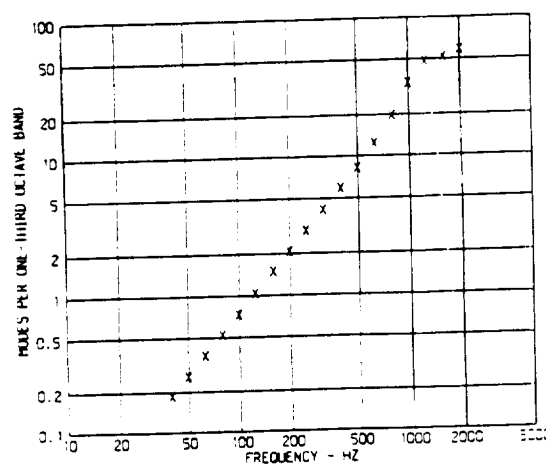


Figure 3. Modes per one-third octave band for the Galileo despun section

APPENDIX B

DATABASE MANAGEMENT

APPENDIX B

DATABASE MANAGEMENT*

In this section the features of the database management mode of operation are described. This operation deals specifically with the creation and maintenance of a vibroacoustic database. The database management commands provide for the entry, editing, and retrieval of data sets. Each data set, obtained at a specific time in flight from a given payload configuration or from a specific test configuration during a given ground test run, is referred to as an <u>event</u>.

The database management functions may be grouped into four major operational phases: spectral data input, event definition and data standardization, administration, and data retrieval. The spectral data input phase is performed using a processor named ENTER; the remaining three phases are performed using processor named PREP, ADMIN, and SERCH, respectively. The use and function of each of these processors is discussed in detail in the VAPEPS USER'S MANUAL. This section discusses the salient features of each processor and rationale behind the design of the processor.

DATA ENTRY

Using the processor command ENTER, spectral data can be placed on any DAL file desired, except for the four files that have been reserved for special use, using any bandwidth in the frequency range from 10 to 10,000 Hz and for a variety of measurement units. By providing the appropriate system control statements before VAPEPS is executed, all original data provided by the user can be saved by permanently cataloging this file in the systems master directory. For a given event, all acoustic data may be placed on file followed by vibration data; or, a mixture of acoustic and vibration data may be placed on file at one time, followed by another such entry at a later time. Once these spectral data have been processed by ENTER, the general computational routines can be called to perform such operations as manipulating these data into various subsets, finding maximums and minimums, and performing statistical analyses, etc.

*Excerpted from VAPEPS User's Manual, Lockheed Missiles and Space Company (see Ref. 2 in this publication)

ENTER is basically a batch-oriented processor which requires the following input: (1) Four 80 character lines providing a general description of the event, using a free-field format (2) frequency range and frequency bandwidth format (a number of entry steps can be eliminated when the American National Standards International [ANSI] one-third octave format has been used for data processing) (3) type of data (acoustic or vibration) and the names or measurement numbers of the data channels (renaming is provided for) (4) measurement units (5) and spectral data in the form of acceleration/pressure spectral density, or sound-pressure/vibration level in dB (narrow-band, amplitude-time data cannot be accommodated). Spectral data is read as a group of FORTRAN-formatted card images which may be arranged to be read from the local system files. ENTER output consists of matrices stored as elements on a user-owned DAL file. Depending on input options, ENTER may also produce a listing of the input data.

The ability to rename measurement channels is necessary because subsequent VAPEPS processing requires that all channel names be up to four characters long, with the first character being an alphabetic character. The renaming feature also permits a user to cope with the situation (most likely to happen in ground test) in which the data processing facility processed all the acoustic data first using a given measurement numbering scheme, and then processed all the vibration data using this same scheme. In the VAPEPS database, each data channel must have a unique name. VAPEPS allows data obtained for a given event to be input in separate batches to accommodate large quantities of data, and permit a user operate on whatever data is available at a given time, rather than wait for all the data to be processed. When the entire data set (acoustic and vibration) becomes available, VAPEPS will collect all data entries and assemble them under the correct event name. This is accomplished with the PREP processor.

EVENT DEFINITION AND DATA STANDARDIZATION

The previously described ENTER processor was basically used to define the attributes of a set (acoustic and vibration) of spectral data for a given event. It is the PREP processor that is used to develop the database for defining the attributes of the event itself. This processor has five subprocessors named CHECK, BOOK, CHAN, CONF, and MODULES. Each of these processors has a multitude of subcommands followed by arguments which will be assigned values to define event attributes. The success of subsequent VAPEPS operations depends on how thoroughly and conscientiously the user assigns values to these arguments. These values can be the free creations of the local user or can be under the control of a global database administrator. A set of worksheets are included with the VAPEPS USER'S MANUAL to assist with the preparation of these values. The database administrator will code and place the values of key arguments into the VAPEPS master file; particular attention should be given to these arguments. The arguments containing key values are those noted on the worksheets as being SERCHABLE. A special processor named DATA DICTIONARY has been designed that will control and define all values of free creations.

A brief explanation of the basic function, including some general commentary of the PREP subprocessors is given below.

CHECK: Collects spectral data from all EVENT sections and forms one standardized spectral data matrix. The need for standardization and the format standard is discussed in the VAPEPS USER'S MANUAL. The one-third octave bandwidth standard was chosen to support the prediction schemes that are presently in VAPEPS.

BOOK: Controls bookkeeping entries for the event. This includes the data processing agency, time, date, type of flight vehicle, and type of event, etc. This is accomplished through the arguments of the various BOOK subcommands. It is the value assigned to the four arguments of the BOOK subcommand named PROC that uniquely identifies an event. The event is automatically coded and the coding is stored in the VAPEPS master file by the database administrator.

CHAN: This subprocessor affects the channel descriptive data previously placed in a DAL file with the processor ENTER. INteger value coordinates, and the type of coordinate system used, for each measurement can be specified using the subcommands of this processor. Perhaps of more importance, the user is requested to identify the frequency range of valid data. This will ensure that a conscious decision is made in this regard, because the frequency range over which valid data was obtained may have been overlooked or unknown when the spectral data was first placed on file. It is accomplished using the CHANGE subcommand.

CONF: A configuration tree such as the one shown in Figure B-1 is constructed, modified, or examined using this subprocessor. Each user is free to form the payload or test specimen configuration tree considered most representative for an event. However, it is essential to develop configuration trees using a consistent format if a successful search of the VAPEPS database can be achieved at a later date. This processor has a number of subcommands that can be used to create a new configuration tree by modifying one that already exists. This avoids the effort of reconstructing an entire tree for events that have similar or even identical payload test specimen configurations.

MODULES: This subprocessor is used to collect the structural parameters and channel names of the acoustic and vibration measurements that are pertinent to a particular branch of a configuration tree and attach the complete data set (called a data module or simply the module) to this tree branch. A tree must exist before this attachment can be made and more than one module can be attached to the same branch. This is accomplished with the MODULE subcommand ATTACH and three arguments named MODULE, CONF, and ZONE of this

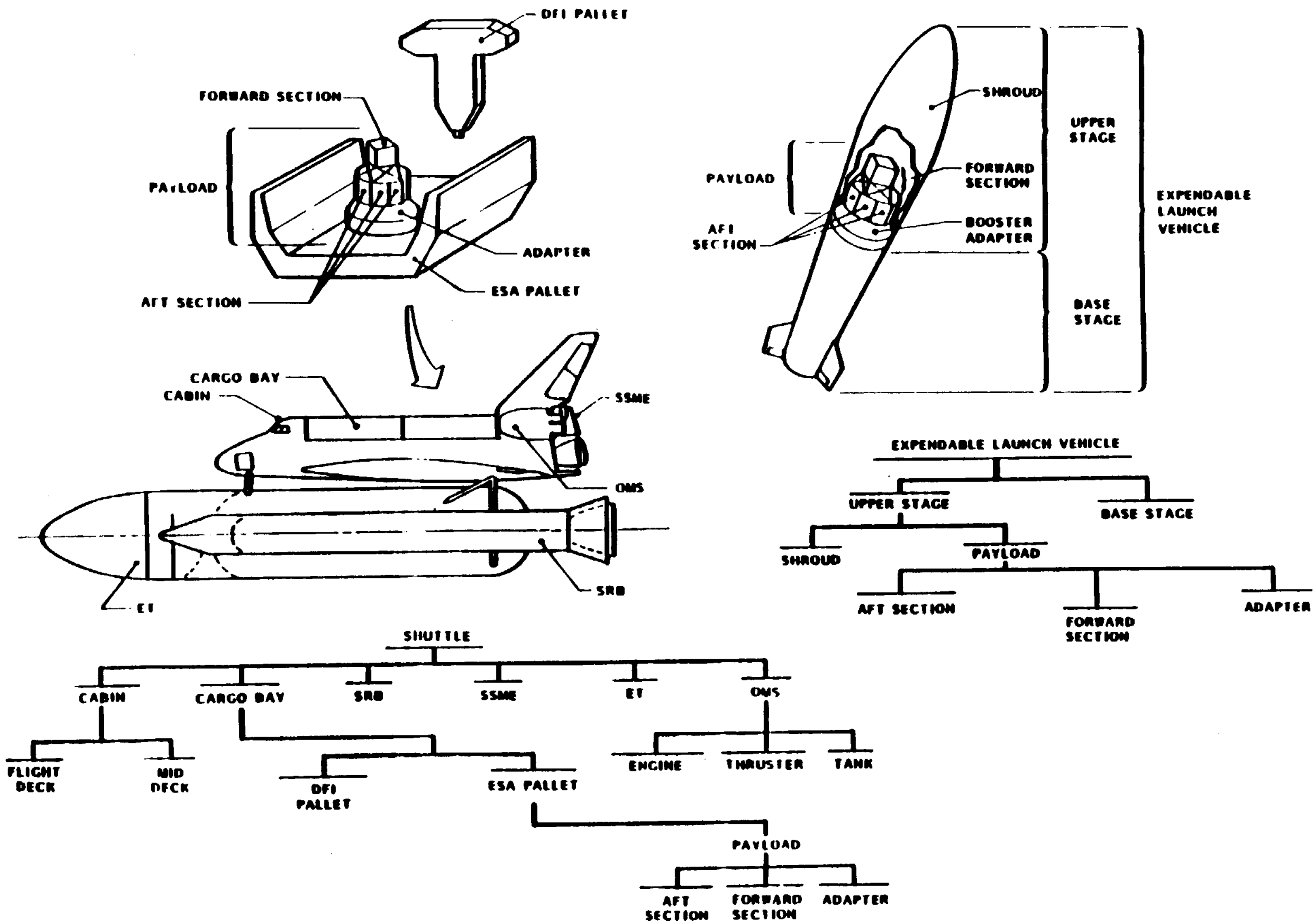


Figure B-1. Configuration Tree

ORIGINAL PAGE IS OF POOR QUALITY

command uniquely identify a module. The argument ZONE and the remaining arguments SYSTEM, X, Y and Z of ATTACH permit the user to create zoning systems for the shuttle vehicles or the ELVs. Each module is automatically given a module number which is placed in the VAPEPS master file by the database administrator. To expedite creating new modules for an event, subcommands are provided to edit and use modules already in existence. Structural parameters and channel names are collected into the module in such a manner that they can be searched for and extracted from the database, and are used to support prediction schemes. Because of this, a module is also referred to as a "prediction model". The module concept is intended to support the prediction schemes presently in VAPEPS or any future modification of these schemes. More than one module can be constructed and attached to the same branch of a configuration tree. It may be useful to construct one module for a given frequency range and another for a different frequency range. Modules can be constructed with or without channel names; this is also the case for structural parameters. This feature permits the user to collect acoustic and vibration data obtained from a particular flight or ground test, and to assign the module containing the channel names to a particular branch of the configuration tree. This then permits the user to search out and operate on this data at a later date. It is the processor named DAMO that is used to build a data module.

The DAMO processor can be activated as a subcommand from MODULES, or it can be activated as a VAPEPS processor command. A DAMO subcommand from MODULES is used to construct a data module and attach it to a particular branch of a configuration tree. When VAPEPS is used to predict the vibroacoustic environment for a payload, the structural parameters for this payload must appear in a data module. In this case DAMO is activated from VAPEPS as a processor command and only structural parameters need be placed in this module; the various arguments of DAMO do not need to be specified. The specific format of the DAMO processor used in MODULES is shown in figure

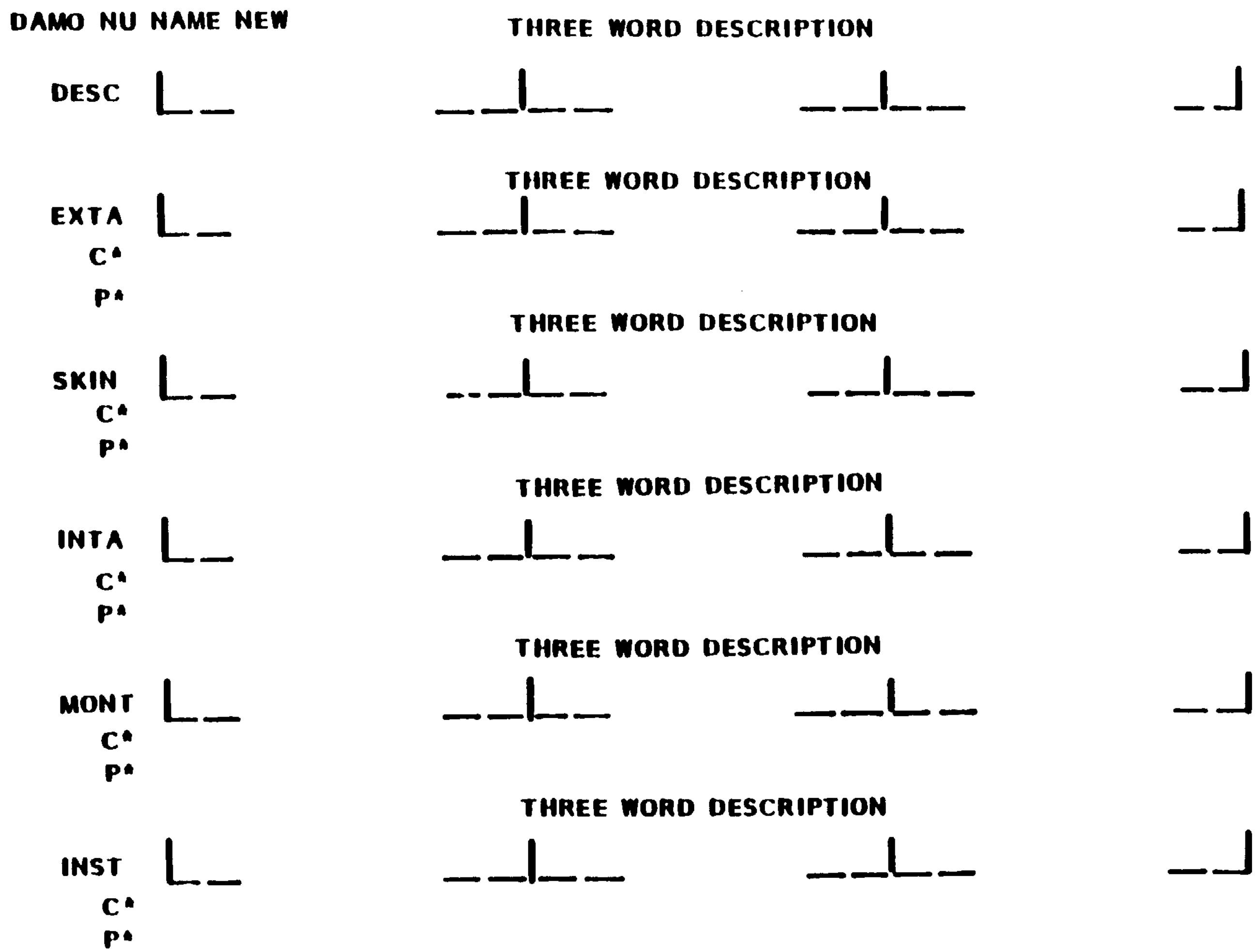


Figure B-2. DAMO Processor Format

B-2. The commands named EXTA, SKIN, INTA, MONT, INST, and FRAM correspond to the names of the prediction model elements described in Section 4. The characters P* and C* following each of these commands represent the structural parameters and channel names, respectively, that are to be associated with each element. The three-word arguments of these commands are provided to allow for descriptive codes to characterize each of these elements. The value of each argument is a free creation of the user; but, in order for a community of users to search from the database an element with prescribed characteristics, a common coding format is necessary. This would be a function for the global database administrator. Appendix C is a discussion of the coding system presently used for the global database.

Figure B-3 serves to illustrate the operation of the PREP processor. Shown is a configuration tree, data module and prediction model that one might construct with this processor for a typical shuttle payload.

ADMINISTRATION

After the tasks for providing spectral data input, and event definition and data standardization have been completed, the data associated with these tasks will exist on preassigned DAL files; it now remains to code and save certain key elements of this data set in the master file of VAPEPS. This is the task of the individual(s) assigned the responsibility of being the database administrator(s). The administrator is charged with the responsibility of maintaining the integrity of the database and processing the transfer of data sets to and from other user sites.

The master file should be write-protected to ensure that multiple users do not attempt to write simultaneously to the file. The recommended approach is to grant write-access only to the VAPEPS administrator or to a small group of administrators who will share the responsibility of saving all events. In maintaining the integrity of the database, the administrator will check all data sets for possible errors and inconsistencies. Having affirmed that the data set contains no errors, the database administrator will write key elements of these data to the VAPEPS master file using the

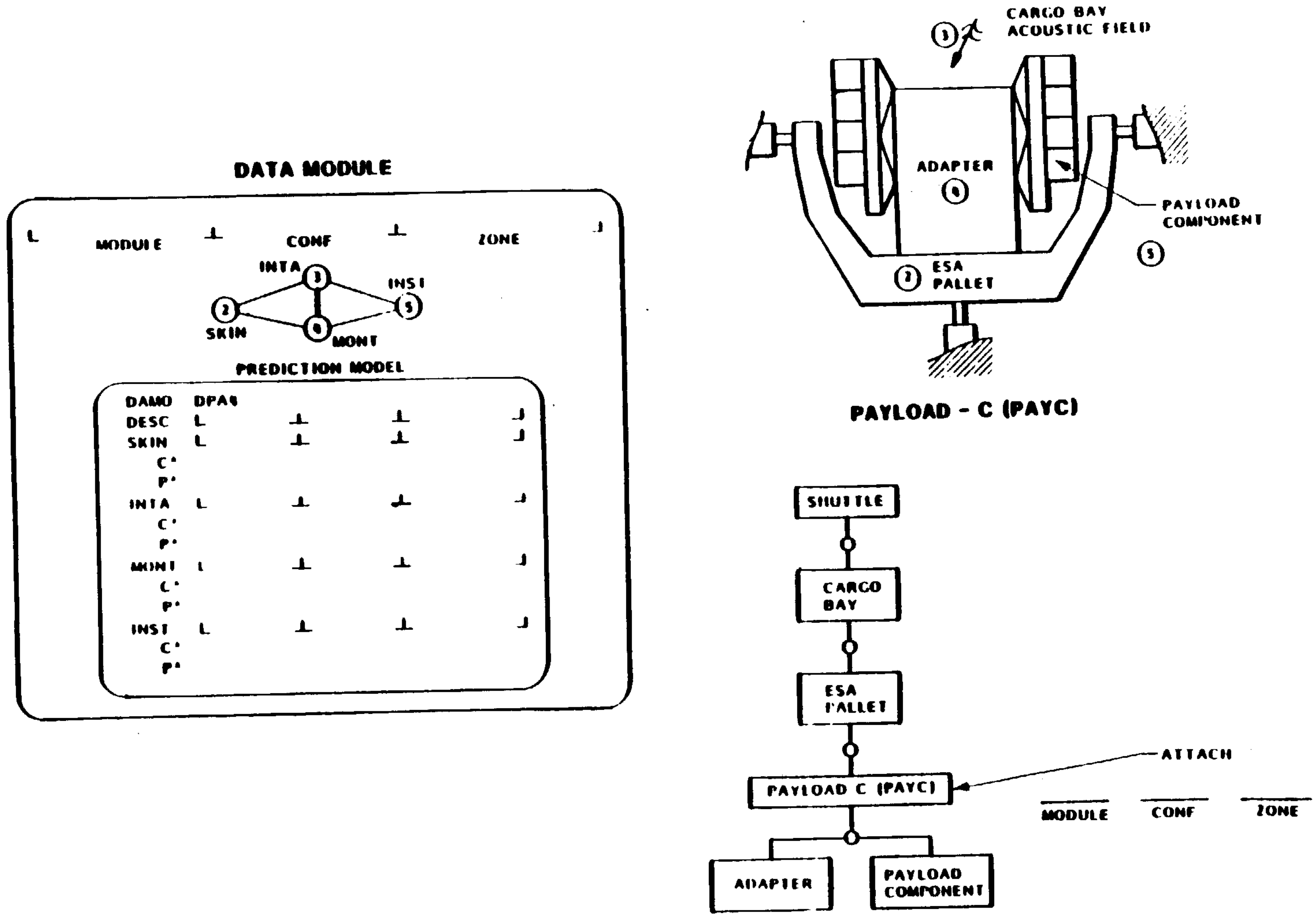


Figure B-3. Concept of PREP Procedures

SAVE subcommand of the ADMIN processor. It is when the SAVE command is issued that the previously mentioned coding of event(s) and module(s) occurs and the results are stored in the VAPEPS master file. These data then become available to the SERCH processor, which the community of VAPEPS users can use to examine these data for prescribed attributes.

The process of transferring a data set to another site involves completely recreating card images of the data provided to the ENTER and PREP processors. This can be performed automatically by using the subcommand of ADMIN named SPILL. The process of reading these data at another site involves the use of general computational commands given in the VAPEPS USER'S MANUAL. A flow diagram of the process of transferring data to and from another site is presented in Figure B-4. Referring to Figure B-4(a), when only a few VAPEPS database events are to be transmitted, the administrator creates the necessary card images using the SPILL subcommand. These card images are read to and written from tape using the general computational command as described in the VAPEPS USER'S MANUAL. The transmitted events are placed on a DAL file via VAPEPS, checked by the administrator and, if appropriate, saved in the receiving site's database using the SAVE subcommand of the ADMIN processor.

If the entire VAPEPS database at one site is to be transmitted, the run streams SPILL and SAVE can be used. Documentation for these two run streams can be found in the VAPEPS HELP file. Transferring the original spectral data and measurement channel data, referring to Figure B-4(b), is accomplished using the run stream ESAV which recreates an ENTER deck for a given event. This is written and read from tape as previously described and placed on the user's DAL file via VAPEPS.

VAPEPS installation instructions for the administrator are provided in the VAPEPS USER'S MANUAL.

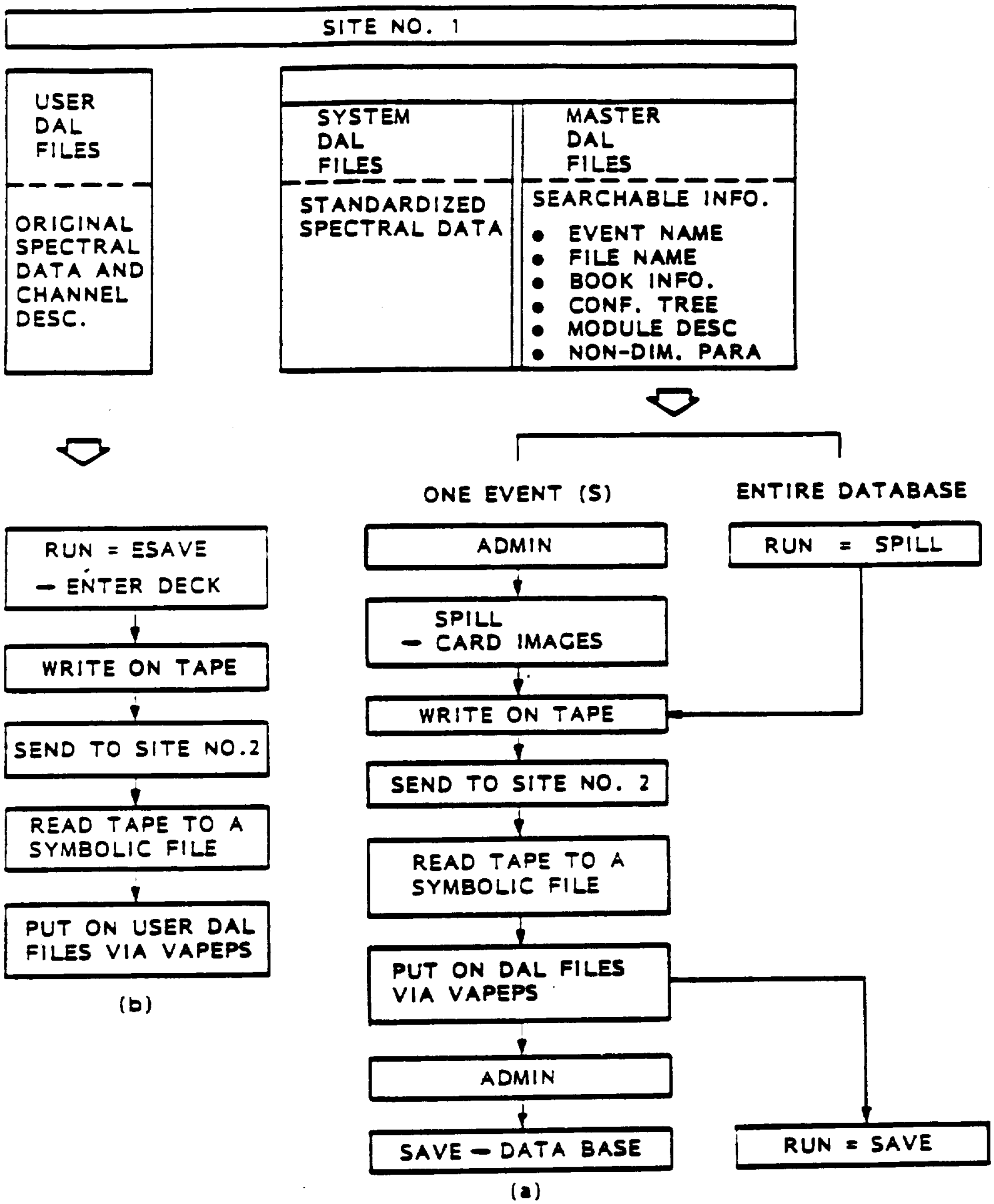


Figure B-4. Data Transfer Flow Diagram

DATABASE QUERY

The SERCH processor enables a user to search the master file for data placed on this file by the database administrator. Command SERCH initiates an interrogation of the master file regarding the data obtained during BOOK, CONF, or MODULE operations that have been performed within the PREP processor. The user specifies those data attributes of interest and the search operation produces a list of coded event names that have these attributes associated with them. Most search requests have three basic forms: (1) all events that have all the attributes requested (2) all events that have at least one of the attributes requested or (3) all events that have none of the attributes requested. Each query may cover all events in the VAPEPS database, or may be limited to those events contained in a previously generated list.

Following is a discussion of the various BOOK, CONF, or MODULE attributes where searches can be made; refer to the VAPEPS USER'S MANUAL for information on the data used to define these attributes.

BOOK: Queries can be made involving the following attributes: processing agency, cognizant agency, contracting agency, date (specific or range), time (specific or range), event name, event type, location, and vehicle.

CONF: Requests are made for events which have configuration tree branches with specified generic names, specific names, or generic and specific name pairs. Requests may be made for events with branches anywhere in the tree or branches with a specific relationship to one another.

MODULES: Queries can be made for events with prediction models or elements of the prediction model which have specified descriptions or nondimensional parameters within a specified range. Queries can be limited to only those models with spectral data channels or to model elements which lie within a specified range of coordinates.

In addition to those described above, the SERCH processor provides the user with commands which manipulate the output lists of events to: (1) perform logical comparisons of two or more lists, (2) list the contents of one or more event lists, (3) list the names of all lists created during a search session, (4) store the list in a user-owned DAL file for future use, and (5) bring a saved list back into the SERCH processor. A status command is also provided which gives the names of the current input and output lists.

To obtain a good understanding of the codes and tabular output obtained in response to various SERCH comments, the user may refer to both the VAPEPS USER'S MANUAL and the Data Dictionary.

APPENDIX C

DATA MODULE NAMING CONVENTION

APPENDIX C

DATA MODULE NAMING CONVENTION*

A VAPEPS data module is created by using the DAMO-processor which is initiated with a command named DAMO. The arguments of this command defines the name of a data module, which is a free creation of the user. There are various subcommands within the DAMO-processor (see page 8-16, 8-17, and 8-18 of VAPEPS USER'S MANUAL). The subcommands DESC, EXTA, SKIN, INTA, MONT, INST, and FRAM are designed to further describe the data modules. Their arguments are also free creations of the user. In this Appendix, the naming convention used by the global data base is illustrated. Other users may define their own convention without effecting the function of VAPEPS. However, for a global database to be shared by the aerospace community, a unified system needs to be established. Presently the data module naming convention is totally oriented toward supporting VAPEPS prediction schemes. However, the naming convention could be expanded to include, for example, reliability/failure related data schemes.

*Excerpted from VAPEPS User's Manual, Lockheed Missiles and Space Company (see Ref. 2 in this publication)

DAMO -- The argument opposite DAMO is a four character word which indicates the content of the data module and the system of units associated with the structural parameters. These are the values given to this word:

A. The first two characters indicate the presence of channel names and structural parameters in the module.

   DO -- only channel names present in the module
   PO -- parameters present only
   DP -- channel names and parameters present.

B. The third character is alphabetic and used to make the various modules of a given event unique.

   --A-
   --B-
   o
   o
   o
   --Z-

C. The last character is an integer used to indicate the units used for the structural parameters

   ---0 no parameters
   ---1 units of meter, kg., sec.
   ---2 units of cm., gram, sec.
   ---3 units of ft., slug, sec.
   ---4 units of in., snail, sec.

The values for the DAMO arguments for a typical group of modules would then be as follows: (1) DPA4; channel names and parameters present, units are in., snail, sec. (2) DPB4; channel names and parameters present, units are in., snail, sec. (3) DOAO; only channel names are present in the module. (4) DOBO; only channel names present.

DESC -- The three word argument opposite DESC describes the general layout of the prediction model contained by the module and characterizes the acoustic and vibration measurements within the module. Each word can consist of up to twelve characters. The following is a discussion of the values given to these words. In this discussion only six characters out of the twelve permitted are used. The remaining six characters can be employed as desired by the user.

A. The first word is a six character code that indicates which of the individual prediction model elements were used for the physical situation being modeled, and whether a conventional or non-conventional prediction model was used. The first character indicates the model convention and the next five characters form a code for the prediction model elements EXTA, SKIN, INTA, MONT and INST, respectively. The following tabulation defines the coding used:

1. First character.

   N - Non-conventional prediction model

2. Next five characters.

1 - External acoustics, parameters present.
2 - Skin structure, parameters present.
3 - Internal acoustics, parameters present.
4 - Mounting structure, parameters present.
5 - Payload component installation, parameters present.
0 - Element not present, or parameters not present.

The value for a typical first word of the DESC argument would be as follows: (1) N12345; a conventional prediction model with parameters present for EXTA, SKIN, INTA, MONT and INST, (2) R32140; a non-conventional prediction model, the INST element is not present, external space acoustic parameters are assigned to INTA, and internal space acoustic parameters are assigned to EXTA.

B. The second word is a six character code used to describe the general characteristics of the acoustic field and orientation of the vibration measurements. The first character of this code, D, is simply a place holder. Characters two through six again form a code for the prediction model elements EXTA, SKIN, INTA, MONT and INST, respectively. The coding associated with these five elements is:

F - free acoustic field
D - direct acoustic field
P - progressive wave acoustic field
S - surface pressure
N - normal (perpendicular to a plane)
L - lateral (parallel to a plane)
U - orientation unspecified
0 - measurements not present

A code with the format DSUF00 would then be interpreted to mean: The EXTA element is a surface pressure acoustic field, the orientation of the SKIN vibration measurements are not specified, INTA is free acoustic field, and measurements are not available for the MONT and INST prediction model elements.

C. The third word is a free word that the user can code as desired. The frequency range over which the prediction model is considered valid could be identified here.

EXTA — The three words of the argument opposite EXTA; and, the corresponding words of the arguments of SKIN, INTA, MONT, INST, and FRAM are used to describe the geometry, material and physical details of the prediction model elements. A convention for this description has been initiated by LMSC, but it is considered preliminary and incomplete. As will be discussed, the establishment of a perceptive convention is important to the success of the VAPEPS prediction schemes. This convention is expected to develop and/or change as the future experience of VAPEPS users so indicates so appropriate. This is the convention being used:

A. The first word is used to provide a description of the geometry of the acoustic space or structure being modeled. Typical values for word are: Rectangle, triangle, curve, cylinder, annulus, etc.

B. The second word is used to provide a description of the general properties of the acoustic space or structural materials. Typical values for this word would be: Air, helium, nitrogen, aluminum, graphite-epoxy, etc.

C. The third word is used to provide a description of the general physical characteristics of each of the individual structural elements or acoustic spaces. It is intended for boundary conditions to be identified with this word although a scheme for doing so remains to be developed. Typical values for this word are: Reverberant, hydrodynamic, honeycomb, corrugation, skin/stringer, etc.

When using VAPEPS to predict the vibroacoustic environment of a new payload component, the best results can be expected when this component is similar to the VAPEPS model on which the prediction is based. The above described arguments will serve to indicate when this similarity exists.

APPENDIX D

DICTIONARY EXAMPLES

APPENDIX D

DICTIONARY EXAMPLES

```
fname 13,'DBT'
fname 15,'DICTIONARY.DAL'
run=padmin 1,t23
dictionary/preadmin 1,t23
define $
root of configuration tree

define 157_db_oaspl
157 dB overall sound pressure level

list
done
admin
save 1,t23
done
run=event t23 all unit=1
```

```
                    VAPEPS
 (VibroAcoustic Payload Environment Prediction System)
                Version 5.4.1
            System MASSCOMP/UNIX
            (Released June 1988)

                Developed by
      LOCKHEED MISSILES & SPACE COMPANY

                Sponsored by
      NASA/GODDARD SPACE FLIGHT CENTER
                     &
        US AIR FORCE/SPACE DIVISION

   -    User support and database management by
          JET PROPULSION LABORATORY

     Date:  Friday, October 28, 1988          Time:  10:32:56 AM.
       Execution mode:  Batch           Core Size:  20000 words
 ?fname 13,'DBT'
 ?fname 15,'DICTIONARY.DAL'
 ?run=padmin 1,t23
 ?dictionary/preadmin 1,t23
The following words have not been defined.
        $ 157_db_oaspl acceptance bulk bulkhead cell cone cruise_msl
        cylin df0000 dfoono dpa4 dpb4 fcav fiberglass forward fuse
        fuselage fuse_cavity gdc gdc_testlab ground harbor_drive jcmp
        n12300 n12340 ncav nose nosecone nose_cavity reverberant
        san_diego sta_18.35 t23 test_chamber tlam tomahawk
Welcome to Data Dictionary version 1.0
Dictionary > define $
$ > root of configuration tree
$ >

$
        root of configuration tree
Dictionary > define 157_db_oaspl
157_db_oaspl > 157 dB overall sound pressure level
157_db_oaspl >

157_db_oaspl
        157 dB overall sound pressure level
Dictionary > list
Word $$$$ not found.
Dictionary > done
Word ACCEPTANCE    not defined.
Word BULK          not defined.
Word BULKHEAD      not defined.
Word CELL          not defined.
Word CONE          not defined.
Word CRUISE_MSL    not defined.
Word CYLIN         not defined.
Word DF0000        not defined.
Word DFOONO        not defined.
Word DPA4          not defined.
```


C-2

```
Word DPB4          not defined.
Word FCAV          not defined.
Word FIBERGLASS    not defined.
Word FORWARD       not defined.
Word FUSE          not defined.
Word FUSELAGE      not defined.
Word FUSE_CAVITY   not defined.
Word GDC           not defined.
Word GDC_TESTLAB   not defined.
Word GROUND        not defined.
Word HARBOR_DRIVE  not defined.
Word JCMP          not defined.
Word N12300        not defined.
Word N12340        not defined.
Word NCAV          not defined.
Word NOSE          not defined.
Word NOSECONE      not defined.
Word NOSE_CAVITY   not defined.
Word REVERBERANT   not defined.
Word SAN_DIEGO     not defined.
Word STA_18.35     not defined.
Word T23           not defined.
Word TEST_CHAMBER  not defined.
Word TLAM          not defined.
Word TOMAHAWK      not defined.
Leaving Data Dictionary.
 ?admin
 ADMIN>save 1,t23
One or more words have not been defined.
Data Dictionary must be updated before event can be saved.
Event not saved.
 ADMIN>done
 ?run=event t23 all unit=1
```

```
fname 13,'DBT'
fname 15,'DICTIONARY.DAL'
run=padmin 1,GLL
dictionary/preadmin 1,GLL
define $
root of configuration tree

define acoustic
acoustic

list
done
admin
save 1,GLL
done
run=event GLL all unit=1
```

```
                    VAPEPS
 (VibroAcoustic Payload Environment Prediction System)
                Version 5.4.1
             System MASSCOMP/UNIX
             (Released June 1988)

                 Developed by
        LOCKHEED MISSILES & SPACE COMPANY

                 Sponsored by
        NASA/GODDARD SPACE FLIGHT CENTER
                      &
          US AIR FORCE/SPACE DIVISION

       User support and database management by
            JET PROPULSION LABORATORY

   Date:  Friday, October 28, 1988       Time:  10:37:05 AM.
     Execution mode:  Batch       Core Size:  20000 words
 ?fname 13, 'DBT'
 ?fname 15, 'DICTIONARY.DAL'
 ?run=padmin 1,GLL
 ?dictionary/preadmin 1,GLL
The following words have not been defined.
         $ acoustic atlantis chamber desp despun despun_sec dfn000 dpa4
         dsp_cone_int galileo gll gll_desp_sec gll_dsp_cone ground jpl
         jpl_aco_chm magnesium n12300 nitrogen pasadena protoflight
         reverberant shuttle stiffeners sts-34 system_level
Welcome to Data Dictionary version 1.0
Dictionary > define $
$ > root of configuration tree
$ >

$
         root of configuration tree
Dictionary > define acoustic
acoustic > acoustic
acoustic >

acoustic
         acoustic
Dictionary > list
Word $$$$ not found.
Dictionary > done
Word ATLANTIS      not defined.
Word CHAMBER       not defined.
Word DESP          not defined.
Word DESPUN        not defined.
Word DESPUN_SEC    not defined.
Word DFN000        not defined.
Word DPA4          not defined.
Word DSP_CONE_INT  not defined.
Word GALILEO       not defined.
Word GLL           not defined.
Word GLL_DESP_SEC  not defined.
```

```
Word GLL_DSP_CONE not defined.
Word GROUND       not defined.
Word JPL          not defined.
Word JPL_ACO_CHM  not defined.
Word MAGNESIUM    not defined.
Word N12300       not defined.
Word NITROGEN     not defined.
Word PASADENA     not defined.
Word PROTOFLIGHT  not defined.
Word REVERBERANT  not defined.
Word SHUTTLE      not defined.
Word STIFFENERS   not defined.
Word STS-34       not defined.
Word SYSTEM_LEVEL not defined.
Leaving Data Dictionary.
 ?admin
 ADMIN>save 1,GLL
One or more words have not been defined.
Data Dictionary must be updated before event can be saved.
Event not saved.
 ADMIN>done
 ?run=event GLL all unit=1
```

APPENDIX E

VAPEPS GLOBAL DATABASE REQUIREMENTS

This appendix contains (1) a VAPEPS Database Checklist and Request for Supplemental Information, and (2) a VAPEPS Database Questionnaire.

VAPEPS Database Checklist
and
Request for Supplemental Information

Section I of the following questionnaire is a checklist of information for data being prepared for the VAPEPS database, but should also be considered when preparing for the acoustic flight or ground test. Also included in the list are items to consider when reviewing and analyzing the resulting data. These questions pertain both to data stored at your local site and to data to be submitted for inclusion in the VAPEPS global database stored at the VAPEPS Management Center (VMC). The second part of this form specifically addresses data sets that are to be included in the global VAPEPS database and requests for supplemental information about each event.

Vibroacoustic data that is submitted to the VMC must be processed into Acceleration Spectral Density form (either narrow band or 1/nth octave band). The VMC cannot accept time history data or data recorded on analog tape due to facility processing and manpower limitations. Data submitted to the VMC should be written on standard 1/2 inch magnetic tape, 1600 bpi, ASCII format in fixed block sizes and record lengths. Please specify the company name, data set name, block sizes and record lengths on the tape.

The data should also be in VAPEPS ENTER processor format. The VAPEPS User's Reference Manual has a complete description of the ENTER processor and the VAPEPS Workshop User's Guide has an illustrative example to follow. You should also review the section in the User's Manual on the PREP processor to determine what additional information will be required by the VMC to process the data set. Specifically, look at the descriptive information required by the BOOK, CHANNEL, CONFIGURATION, and MODULES subprocessors within PREP. Statistical Energy Analysis (SEA) models should be included with the data, although they are not actually required to store the data. VMC personnel have experience in SEA modeling and can assist in you in this area.

One of the VMC's main objectives as the VAPEPS database administrator is to acquire, validate and maintain the global VAPEPS database. To assist in this function, a VAPEPS Technical Review Committee will review each new data set for accuracy, consistency of data formats and completeness. The supplemental information requested by this form will assist the committee in understanding and reviewing the data and will help to ensure that only valid information is entered into the global database. In this manner, VAPEPS users in the payload community can be assured that the integrity of the shared database will be maintained.

VAPEPS DATABASE QUESTIONNAIRE

I. GENERAL CONSIDERATIONS - ACOUSTIC GROUND/FLIGHT TEST

1. Was the acoustic field diffuse? VAPEPS Statistical Energy Analysis (SEA) models assume that the acoustic elements are reverberant spaces. Was a turbulent boundary layer present? The VAPEPS software can model turbulent boundary layers as progressive waves.

2. Were there sufficient microphones to adequately describe the acoustic field and/or to control the test? Since VAPEPS uses statistical methods, a large number of microphones are advantageous and will improve the statistical quantities.

3. Were the microphones properly placed?

4. Was there much spatial variation in the measured acoustic levels?

5. Were there sufficient numbers of accelerometers to adequately measure the response of the test article? Again, since VAPEPS predictions are based on statistical methods and averaging, the more measurements on a particular structural element, the better.

6. Were the accelerometers installed or bonded properly?

7. Were gains, offsets, attenuations, etc., properly set and checked?

8. Was noise, distortion, or clipping a problem or consideration?

9. Were all the transducers properly and recently calibrated?

10. Was an end to end system calibration or check-out performed prior to the test?

11. Is the data stationary?

12. Was the data recorded for a sufficient period of time?

13. If digital analysis was used to produce spectra:

    a. Was the sampling rate sufficient to avoid aliasing?

    b. Were proper filtering/windowing techniques used?

    c. VAPEPS converts all spectral data to 1/3 octave bands. Were the test analysis bandwidths appropriate for this?

14. Were there any anomalies or unusual occurrences that may have influenced the data?

15. Does test data compare well with VAPEPS SEA predictions (if a prediction was made)?

II. REQUIRED INFORMATION

The objective of the VAPEPS database is to provide vibroacoustic data which can be extrapolated to new configurations using the VAPEPS Extrap I, Extrap II, or some other semi-empirical technique. All of these techniques require some knowledge of the baseline data structure and acoustic levels. As a minimum, the following must be included with data submitted for inclusion in the VAPEPS database:

1. Is there a written report on the flight or test that can be released to VMC personnel?

Please provide the following information if it is not included in the report:

2. Sketches or photographs of the facility or vehicle configuration showing transducer locations and coordinate systems.

3. Sketches or photographs of the test article or payload showing transducer locations and coordinate systems.

4. Drawings, sketches, or written description of the test article's structural configuration. Is the structure a plate, cylinder, cone, beam, truss, sphere, etc.?

   Is it a simple uniform plate structure, or is the construction honeycomb, composite, skin stringer, etc.?

   What is the material?

5. What is the mass per unit area for each element for which vibroacoustic data is provided?

6. What is the thickness of each element for which vibroacoustic data is provided? In the case of honeycomb, provide thickness of each layer.

7. What is the equipment mass loading (mass per unit area)?

   Where is the equipment located?

8. What are the dimensions (width, breadth, radius, etc.) of the structural elements?

9. What are the edge conditions (baffled or unbaffled, free or supported)?

10. What are the acoustic spectrum levels?

11. Is the excitation one-sided or two-sided?

12. Descriptions or block diagrams of the measurement system including transducers, recorders, analyzers, control systems, etc. (Manufacturers and model numbers are desirable, but not required).

13. A list of pertinent instrumentation characteristics such as frequency responses, filter characteristics, sampling rates, etc.

14. A brief description of how the test was controlled.

15. A brief description of the calibration procedures.

16. If digital analysis was used to produce the spectra, what were the number of averages used?

17. What were the analyzer bandwidths used?

18. If spectral data were plotted in 1/3 octave bands, were the data analyzed in:

    a. 1/3 octave bandwidths?

    b. Other bandwidths and then converted to 1/3 octave bands?

19. If converted to 1/3 octave bands, what were the original bands?

20. What was the method of conversion?

21. Were "noise floor" spectra analyzed?

22. Were "noise floor" spectra plotted for comparison with data spectra?

23. Were the data signals examined for distortion and/or clipping?

24. Were the data considered stationary or steady state during the analysis periods?

25. Were the test data compared with VAPEPS predictions?

    If yes:

    a. In general, how did the two compare?

    b. If a comparison report was written, can your organization release a copy of it to the VAPEPS Management Center?

26. If a finite element model of the test or flight article was developed, can your organization release the results if necessary?

27. Additional comments or information:

Please forward this completed questionnaire, supplemental information (reports, drawings, etc.) and tapes to:

VAPEPS Management Center
Jet Propulsion Laboratory
MS 301-456
4800 Oak Grove Drive
Pasadena, CA 91109

NAME: ______________________________

TITLE: ______________________________

ORGANIZATION: ______________________________

ADDRESS: ______________________________

____

PHONE: ______________________________

TECHNICAL REPORT STANDARD TITLE PAGE

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9. Performing Organization Name and Address JET PROPULSION LABORATORY California Institute of Technology 4800 Oak Grove Drive Pasadena, California 91109		10. Work Unit No. 11. Contract or Grant No. NAS7-918 13. Type of Report and Period Covered Final Report
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15. Supplementary Notes

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16. Abstract

This report outlines a procedural method for creating a VAPEPS Database. The method of presentation employs flowcharts of sequential VAPEPS Commands used to create a VAPEPS Database. The commands are accompanied by explanatory text to the right of the command in order to minimize the need for repetitive reference to the VAPEPS user's manual. The method is demonstrated by examples of varying complexity. It is assumed that the reader has acquired a basic knowledge of the VAPEPS software program.

17. Key Words (Selected by Author(s))		18. Distribution Statement	
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